MARSHES, MARSHES, MARSHES[1]: REGULATORY IMPLEMENTATION STRATEGIES FOR URBAN COASTAL WETLANDS

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INTRODUCTION

The trying history of New York City's vast Jamaica Bay wetlands area is increasingly familiar on the pages of local newspapers, and the statistics are appropriately alarming; approximately 75% of the Bay's original wetlands have vanished. Within a few short generations, one of the City's most important coastal resources can vanish completely, unless truly dramatic action is taken. These news reports often present the Bay as a resource inevitably placed in peril by urban expansion; less often discussed is the potential for the Bay's conservation – and restoration – to be fueled by urban expansion. This approach is, on its surface, a logical disconnect, but it is also one with historic precedent. During most of the 19th century, the vast wetlands of Jamaica Bay were at the heart of New York's then-thriving shellfish and fishing industry. Jamaica Bay and its surrounding urban community need not exist in opposition to each other. The successful preservation of such coastal areas hinges on the extent into which they are woven into the rich fabric of the urban environment, and thus become a foundational building block for future growth.

Urban areas have a well-deserved reputation for expanding at the expense of their natural resources; fewer commentators have investigated the more complex dialogue between large cities and the natural resources which do exist. The same regulatory growth strategies which have diminished natural resources have the ability to conserve, – and enhance, them. The decline of urban coastal wetlands has hardly gone unnoticed by

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[1] See *Brady Bunch: Her Sister's Shadow* (ABC television broadcast, Nov. 19, 1971). Jan Brady (Eve Plumb) was upset that teachers at her school constantly compare her with her older – and more popular – sister Marcia, and famously utters her sister's name out of jealously ("Marcia! Marcia! Marcia!"). *Id. See also* THE BRADY BUNCH MOVIE (Paramount Pictures 1995).

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planners and legislators; an armory of regulatory strategies has been devised with the intent of preserving urban wetlands and coastal resources. Decades ago, urban coastal wetlands were often viewed as nothing short of a nuisance or impediment to development. A more mature and educated view of such wetlands as urban assets, rather than liabilities, has increasingly overtaken the previous approach of growth regardless of environmental costs. However, current and historical regulatory strategies have proven inadequate as a means of stemming the decline of such resources. These regulatory protections are insufficient for a variety of reasons, but chief among them is their lack of integration with urban growth mechanisms. Environmental protection and urban planning initiatives have existed along parallel tracks and, too often, have worked at cross-purposes.

Jamaica Bay has a positive relationship with New York's urban ecology, as the Bay provides many valuable services. The Bay's wetlands hold a critical ecological function relating to water quality by acting as a filter for proximate pollution and serving as a natural, secondary treatment system. The Bay provides structural value by protecting nearby population and infrastructure against flooding and storm surges (events which may eventually increase corresponding to the continuing rise in greenhouse gas emissions). The Bay also acts as an important primary habitat for marine, aviary and upland species; it has a longstanding reputation as one of the better bird watching areas in the region. Finally, the Bay performs an important aesthetic and recreational function by providing urban residents with an opportunity to interact with natural systems. The Bay remains a critical, but little-known, component of urban infrastructure perhaps as important to the urban system as its subways or towering office buildings. However, the Bay also has a negative relationship with the City; the health of its wetlands has been severely impacted by a variety of urban development actions, including sewage and direct water outfall practices, navigation dredging, construction fill, shoreline hardening, and, most insidiously, non-point source pollution including street run-off. These impacts have created "dead zones" within the Bay's waters, and are resulting in the steady disappearance of its features. Coupled with the potential impacts associated with sea level rise and climate change, the coastal area will experience a substantial survival challenge in its near future. Planners have recently recognized the challenges which lie in the coming years, and have proposed an ambitious protection plan (unveiled in draft form in 2007); however, it is unknown if this plan will actually "stem the tide" to preserve or restore the Bay's fragile ecosystem.

This paper examines the Jamaica Bay watershed and wetlands as a primary

case study in urban coastal wetlands through an exploration of the historical and contemporary relationship between urban growth and coastal natural resources, as well as a detailed analysis of the success or failure of recent regulatory protection measures. The Jamaica Bay analytical outcome is then briefly compared with regulatory protections and other strategies instituted for several other urban area coastal wetlands. Finally, the paper advances a recommended regulatory strategy for urban coastal wetlands protection.

Paramount throughout the analysis is the "result oriented" measurement of legal protection; the best of intentions and legal designs often fail to achieve their intended results due to a variety of external factors which prevent implementation. If coastal wetlands are to be successfully woven into the complex legal mixture of urban decision-making (and thus given an equal footing with other social and economic needs), it becomes evident that the most effective environmental protection strategies are those which extend well beyond traditional environmental law, and place wetlands considerations into the nexus of transportation, infrastructure and population growth programs which compose the backbone of urban areas. The primary gap in urban coastal wetland planning is simply not one of sufficiency or breadth of legal protection – such protections may already exist; rather the primary challenge for urban coastal wetlands is structural integration with other, potentially conflicting initiatives.

AN URBAN COASTAL WETLANDS PRIMER

A. Historic urban growth and coastal resources

Urban centers have historically been paired with their coastal and riverine locations. The settlement of cities dating back to the earliest population centers in Sumeria (circa 4000 BC) has been associated with their proximity to water resources utilized both as a means of trade-based transportation, as well as agricultural production. Coastal locations were of particular importance to cities as international maritime trade evolved; while few recent studies exist, it is likely that coastal wetlands were recognized for their extractive value and role in urban agriculture (such as hay operations) and primitive aquaculture or shellfishing. It is hardly an accident that many of the world's largest cities have been located in coastal areas or along proximate tributaries.

As a means of sustenance, wetlands played an active role in historic urban economies in the pre-industrial era. Permanent settlement occurred less often on or immediately proximate to wetlands due, perhaps, to their frequent or occasional flooding. While sustainability initiatives were not necessarily touted by municipal politicians in the pre-industrial era, wetlands were more recognized for their roles within economies or cultures more dependant upon the continued presence of natural resources. There is even anecdotal evidence of colonial-era land use restrictions and protective laws for urban tidal wetlands, as a means to preserve their use for hay and shellfish production (although certainly, many colonial frontier settlers generally saw wetlands as nuisances and encouraged their drainage).[2]

However, the advent of modern urban areas within the context of the late 19th century rise of industrialization dramatically rewrote the script of urban wetland resources. Wetlands would play a role in the skyrocketing rates of urban growth, but their role was only one of immediate utilization and eventual destruction. Urban wetlands were viewed as areas to be filled and developed with dense settlements. The rise of urbanized industrial centers meant that wetlands would serve as a disposal site for outfalls; much of which was untreated before the passage of the Federal Clean Water Act in 1972.[3] Consequently, much of the urban history of wetlands was one of steady, gradual destruction or diminishment. The ecological, social and protective value of urban coastal wetlands, recognized implicitly during the pre-industrial era, was largely forgotten.

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[2] Tiner et al. WETLANDS STATUS AND TRENDS FOR THE HACKENSACK MEADOWLANDS: US FISH & WILDLIFE SERVICE (2002) at 26 available at http://library.fws.gov/Wetlands/Hackensack.pdf. ("In the 1700s, salt marshes were considered valuable property, and local statutes were promulgated to protect them and maintain them for salt hay harvest." *Id.*) *See also* Thomas Dahl & Gregory Allord, U.S. GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2425: HISTORY OF WETLANDS IN THE CONTERMINOUS UNITED STATES (undated) available at http://wetlandsfws.er.usgs.gov/status_trends/Technical_Documents/History_of_Wetlands.pdf ("During the 1700s, wetlands were regarded as swampy lands that bred diseases, restricted overland travel, impeded the production of food and fiber, and generally were not useful for frontier survival. Settlers, commercial interests, and governments agreed that wetlands presented obstacles to development, and that wetlands should be eliminated and the land reclaimed for other purposes. During the mid-to-late 1700s, as the population grew, land clearing and farming for profit began to affect larger tracts of land; many coastal plain wetlands were converted to farmland." *Id* at 20).

[3] William L. Andreen, Beyond Words of Exhortation: The Congressional Prescription for Vigorous Federal Enforcement of the Clean Water Act**.** 55 Geo. Wash. L. Rev. 202 (1987).

B. A Return to History: The Revitalization of Urban Coastal Wetlands

The reawaking of civic conscious regarding urban coastal wetlands occurred during the 1960s and 1970s as a reaction to the largely unrestricted use of wetlands for development purposes; urban citizens were losing one of their few connections to a natural ecosystem.[4] More recently, urban wetlands have been recognized for their potential benefits in reducing flood-related impacts, for their habitat value, and for their role in improving urban water quality.[5] Corresponding to social and scientific demand, urban wetlands are best protected by an interlocking layer of regulatory strategies at the federal, state, regional and local levels. It is the challenge posed by proximate urban relationships which serves as both the threat towards and measure of success of urban wetlands; they are defined by their social role in human communities in which space is a valued commodity.

Urban coastal wetlands also experience a threat – and benefit – which is unique to urban settlements. Urban wetlands are highly sensitive to development, road construction and other activities which alter drainage, soil absorption or water flow, all of which is greatly heightened in an urban upland watershed.[6] Urban wetlands may be found scattered in unique locations, as they may include aquatic remains of creeks or ponds now consumed by development, drainage ditches along roadsides, as well as traditional coastal marshlands.[7] Urban "runoff" is a primary pollutant source; pollutants mix with stormwater and the resultant mixture contains industrial chemicals and nutrients including petroleum-based hydrocarbons, nitrogen and phosphorus.[8] Urban wetlands buffer storm surges and help to minimize flooding, as well as helping to purify "runoff" pollutants before the eventual destination of water in streams, rivers, bays and oceans.
Urbanization is occurring most rapidly, on a global basis, in coastal areas. Urban coastal wetlands have a different set of ecological behaviors from their non-urban counterparts, due to the unique impacts of dense human settlement upon hydrology, geomorphology, and ecology.[9] Urban coastal

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[4] Karl S. Coplan, Refracting the Spectrum of Clean Water Act Standing in Light of Lujan v. Defenders of Wildlife, 22 COLUM. J. ENVTL. L. 169 (1997).

[5] Sam Kalen, *Commerce to Conservation: The Call for a National Water Policy and the Evolution of Federal Jurisdiction over Wetlands*, 69 N. DAK. L. REV. 873 (1994).

[6] Department of Environmental Protection, CATTAIL AND COMMON REED GULLIES: ARTIFICIAL, ACCIDENTAL Wetlands (2000) available at http://www.dep.state.pa.us/dep/subject/pubs/water/wqm/FS1435.doc. unpaginated.

[7] *Id.*

[8] *Id.*

[9] Joan Ehrenfeld, *Evaluating Wetlands in an Urban Context*, 4 URBAN ECOSYTEMS 69-85 (2000). Available at http://www.springerlink.com/content/j2p5631127600409/

wetlands are defined by not only the environmental footprint of their nearby cities, but are also defined by their human use. Urban coastal wetlands have associative values to their urban populations; they provide contact with a complex ecology and unique recreation otherwise impossible in a "concrete jungle."[10] The success of urban wetland restoration and conservation is contextual; specifically, the baseline measure of reference is not a platonic, non-urban wetland but instead a successful coastal wetland area which now places a vital, recognized role in the structure of its surrounding urban community.[11]

Urban coastal wetlands cannot be divorced from their social context or preserved in isolation outside of the urban process. Urban wetlands serve a critical urban function as they are often some of the only reminders of natural vegetation. They also serve as a means of water storage, critical wildlife habitats, environmental education centers, and aesthetic resources. As urban areas develop both outward and upward, urban wetlands are increasingly stressed. "The potential for cumulative impacts of stressors on urban wetlands means that these impacts cannot be analyzed in isolation."[12] Emphasis or use planning for one function may prove harmful or otherwise incompatible with any other function. For example, the use of urban wetlands as a means of wastewater treatment may introduce high nutrient levels and modify hydrological character, thus preventing the wetland from hosting or restoring native plant communities. Accordingly, wetlands should be understood as quantitative models on several levels, but also for their "social drivers" which indicate community concerns needed to be addressed in environmental decision-making (for example, a perception of wetlands as unsafe areas); these "social drivers" may serve as "the most critical information needed to assist in ecosystem management, particularly in facilitation of effective human decision making". Key quantitative areas in urban wetlands planning include modeling impacts of hydrological and nutrient inputs, as well as measuring the unmet needs of urban infrastructure for stormwater retention and nutrient filtration. Accordingly, an effective analysis of urban coastal wetlands must address both its natural and social ecologies.

Urban wetlands are literally valued by nearby residents, and as such are clearly no longer the nuisance of the early 20th century. One recent study

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[10] *Id.*

[11] *Id.*

[12] WETLANDS ISSUES IN URBANIZING AREAS (2001) available atedhttp://water.oregonstate.edu/wetlands/about.htm

tracked the preferences of urban residents to live near wetlands. 15,000 home sales in Portland, Oregon were cross-referenced with environmental characteristics and proximity to wetlands. The study then measured both the "hedonic" price function (the value in relation to proximity of environmental resources); then the study analyzed a "willingness to pay" in relation to different types of wetlands.[13] The results revealed that in urban areas, close proximity to open water and larger wetlands has a "significant influence" on increased residential property values.[14] Clearly, there is a growing social consciousness regarding urban wetlands; the overarching question to be investigated is if legal structures are sufficient to result in effective wetlands protection.

Certain coastal areas or other aquatic resources have received increasing attention from urban planners; the rebirth and revitalization of abandoned or depressed industrial areas or commercial cores has accompanied, in some instances, the "showcasing" and restoration of water resources.[15] Certain cities have proposed "daylighting" tributary rivers long since covered up; other cities have produced successful greenways and riverwalks.[16] These urban design efforts are often accompanied by increased awareness and public enforcement pressure. Despite the increasing attention provided by urban designers to water resources, many coastal wetlands do not hold a high visibility in the public spotlight. Certainly, evidence indicates that there is a potential for public awareness or support of urban wetlands (and urban natural resources in general).

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[13] CASE 8: USING HEDONIC PRICING TECHNIQUES TO VALUE URBAN WETLANDS IN THE US (2005) available at http://www.iucn.org/themes/wani/value/cases/c8.html

[14] *Id.*

[15] The Nervion River in Bilbao, Spain is an estuary which is one of the most polluted rivers in Spain. Recent efforts in the early 1990s to revitalize Bilbao's industrial port as a tourist sector (including the opening of architect Frank Gehry's famous Guggenheim Museum) has accompanied regulatory efforts to abate pollution. While by no means a pioneer in urban revitalization, Bilbao's example has a global influence upon urban planners. *See* Garciacina et al., *Assessing the Improvement of the Bilbao estuary water quality in response to pollution abatement measures*, 40 WATER RESEARCH 951 (2006) available at http://www.aseanenvironment.info/scripts/count_article.asp?Article_code=41012703.

[16] The nation's first "Riverwalk" was created in San Antonio by architect Robert Hugman in the 1920s as an alternative to paving over the river. Hugman proposed a commercial district called "The Shops of Aragon and Romula" built next to the river, along with flood control measures. The project was funded in 1939 and has had a global influence on urban riverine revitalization. *San Antonio Riverwalk* (2006) at http://txtell.lib.utexas.edu/stories/s0005-full.html. *See also* Los Angeles River Revitalization Master Plan (2002; 2007) at http://www.lariverrmp.org/index.cfm

A. Coastal Zone Management Act

The federal Coastal Zone Management Act of 1972 (CZMA) was enacted with the goal to "preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations."[17] [18] The CZMA was given a revolutionary legal structure, and serves as an incentive "carrot" seeking harmonize coastal policies at multiple levels, rather then the more traditional "stick" of delegated federal enforcement seen under statutes such as the Clean Water Act.

Under the CZMA, provided that a state enacts its own legislation or planning activity which incorporates the broad federal goals, it is provided with federal funding for implementation activities. The CZMA requires that state management programs include the boundaries and inventory of the coastal zone area, permitted land and water uses which impact coastal waters (as well as implementing measures), priority uses within those areas, energy facility siting guidelines, and a planning process for coastal erosion. Each eligible state receives annual federal grants of between $500,000 and $2 million. Additional grants are provided to study specific coastal issues, including wetlands protection, public access, development impacts, and coastal hazards. The CZMA encourages unified policies which use thwatershed as a frame of reference. "All governmental units within the watershed have some incentive to cooperate and work together because their fates are all tied to the watershed."[19] Activities and involvement by all levels of government regarding coastal resources should be generally consistent. In addition, CZMA amendments introduced an additional incentive for supplemental planning activity to control non-point source water pollution in coastal areas. The state agency managing the coastal program is required to have an effective strategy to continually consult with a wide variety of government agencies, with the particular goal of ensuring local governments with participation in implementation. This strategy also "implicitly recognizes sovereignty of local governments on land use issues which consequently affect coastal development."[20]

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[17] 16 U.S.C. 1451-1452 (2000).

[18] Coastal Zone Management Act 2002 amendments http://www.legislative.noaa.gov/Legislation/czma.html

[19] *Id.*

[20] Randolph R. Lowell, *Coastal Smart Growth*, 22 PACE ENVTL. L. Rev. 231, 252

The CZMA also provides an integrated approach to urban coastal wetlands; its goals are addressed not unilaterally, but, at least in theory, during the course of a broad range of federal, state and local actions concerning other objectives.[21] This approach ideally ensures harmonization of regulatory decision-making at all levels. In addition, the CZMA is consistent and compatible with the existing framework of both procedural environmental laws, such as the National Environmental Policy Act, as well as stricter, outcome-oriented laws such as the Clean Water Act. [22] However, the CZMA is largely procedural and lacks stringent requirements (include a citizen suit mechanism distinction from the federal Administrative Procedure Act); CZMA requires the consideration of a broad range of planning goals, but lacks the ability to ensure a certain or consistent outcome.[23] Because CZMA is delegated to states for implementation with a wide range potential implementation possibilities, there is little consistent understanding of the law due to its more parochial appearance. Therefore, while the CZMA has the potential to serve as an effective protection measure for urban coastal wetlands by nature of its unique structure, this very structure has rendered the law as a somewhat toothless paper tiger.

34 states and territories have created coastal zone management agencies which have received NOAA's federal approval, covering approximately 99% of the nation's shoreline. [24] The CZMA acts on a state-based model and is an important step in the "de-federalization" of environmental law.[25] Rather than pursue a centralized federal implementation of uniform criteria, as prevelant in the Clean Water and Clean Air acts, the CZMA simply established broad standards and left it up to states to devise the most effective or desired regulatory strategies to actually implement these standards. State participation is only voluntary, although at least 34 states and territories have now successfully met federal standards for their implementation programs. The federal government strongly incentivizes state participation by providing implementation funding, and granting states a degree of control over certain federal activities within the coastal zone.[26]

(2005).

[21] *Id*.

[22] 16 U.S.C.§ 1456 (2007)

[23] *See* Lowell, note 20.

[24] *See generally* NOAA, Coastal Zone Management (2007) available at *http://coastalmanagement.noaa.gov/czm/czm_act.html*

[25] Bruce Kuhse, *The Federal Consistency Requirements of the Coastal Zone Management Act of 1972: Its time to repeal this fundamentally flawed legislation*, 6 Ocean & Coastal L.J. 77 (2001).

[26] *See* Lowell, note 20.

It may have been considered more likely that CZMA would be successfully implemented if there was more localized flexibility and "ownership" of implementation strategies. CZMA extends its broad federal standards through states, and ultimately to the most local levels:

> The drafters of CZMA recognized that for the Act to be successful, it needed to be implemented at the local level, given that significant land use controls are adopted and administered by municipalities. States are required to establish an effective plan for continuing coordination between the management agency and other local bodies. [27]

The CZMA vests much of the decision-making power to state governments by ensuring that federal agency activities or decisions must be consistent with state coastal planning and policies "to the maximum extent practical."[28] This coordination under CZMA is also applies to state agencies; other state actions must be consistent with coastal planning goals.[29] The Coastal Management Plan developed under CZMA is ultimately intended as a "checklist" for government actions, and language suggests that even state governments may not have to strictly adhere to the plan, as they must comply with each policy under the plan only "as much as is legally and physically possible."[30]

In New York, local governments are encouraged by the state to create localized waterfront and coastal plans, which allow for local implementation regarding natural coastal resources and economic development of waterfronts. These local governments receive financial assistance and technical advice from the state. The local plan is intended to include both planning goals and structural implementation through local laws. These local plans become amendments to the state coastal plan, and are a creative means for local governments to set policies for state and federal actions.[31] However, local waterfront and coastal planning efforts are not integrated into local land use decision-making processes. "While the Executive Law sets forth a list of items that are to be included in the LWRP [local waterfront plan], the statute is silent regarding the relationship between the LWRP and local comprehensive land use plans and zoning."[32]

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[27] Patricia E. Salkin, *Integrating Local Waterfront Revitalization Planning into Local Comprehensive Planning and Zoning*, 22 PACE ENVTL. L. REV. 207, 211 (2005).

[28] *Id*.
[29] *Id* at 210.
[30] *Id* at 214.
[31] *Id* at 217-218.
[32] *Id*.

Zoning actions must be generally consistent with a locally-adopted comprehensive plan. New York's state law which enables local land-use and zoning actions has explicitly rejected the idea of a single written comprehensive plan, preferring instead to consider a comprehensive plan to include (but not be limited to) a range of reports, resolutions, maps and other materials that identify municipal growth and protection goals.[33] Although the legal enforceability, in the zoning context, remains uncertain, courts have considered local waterfront plans developed under CZMA as part of a comprehensive land use plan when examining the sufficiency of zoning determinations.[34] In New York, municipalities have taken a variety of approaches to developing coastal plans, as state CZMA regulations do not specify how state CZMA goals are to be coordinated with local land use controls. Some municipalities have created local plans in accordance with existing comprehensive planning goals, while others have used their plans to develop a more specific vision for their waterfront (and amend their comprehensive plans subsequently).[35] New York City adopted a Comprehensive Waterfront Plan in the early 1990s as a means of guiding future development. The plan was incorporated into City actions through a new waterfront zoning amendment. The City's Planning Department acts as the body which reviews actions for consistency of City actions with the Plan.[36]

As a means of comparison, in Oregon, the state zoning enabling act requires that local comprehensive plans have specific requirements for all local comprehensive plans to address coastal resources (including marine conservation goals and specialized shoreland boundary requirements). In the state of Washington, municipalities are required under the state law to adopt shoreline management programs "'"to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines."[37] Municipal plans must address state guidelines, including the adoption of a coastal zoning strategy, but may also be crafted to meet specific urban or municipal needs. Therefore, at least some municipalities have integrated their shoreline or coastal conservation plans into local ordinances.[38]

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[33] *Id* at 222.
[34] *Id* at 225.
[35] *Id* at 224-226.
[36] *Id* at 227.
[37] *Id* at 229.
[38] *Id* at 228-229.

One commentator has noted the need to provide a definitive link between the urban comprehensive land use plan, and the local waterfront plan.

> To further ensure that New York's local governments are most effectively planning for and managing their waterfronts, the Legislature should take affirmative action to statutorily express that once adopted and approved, an LRWP [local waterfront plan] becomes part of an existing comprehensive land use plan. This will not only lay a foundation upon which zoning must be adopted and amended consistent with the policies, principles and strategies contained in the LWRP, it will also provide added opportunities for local enforcement of waterfront protections through local zoning. Because New York is not alone in its need to clarify the relationship between the local comprehensive land use plan and the local coastal protection plan, Congress should, when reauthorizing the Coastal Zone Management Act, ask states to specifically link the two plans.[39]

The continuing inability to link local comprehensive planning with local waterfront plans is a serious, if not critical flaw in CZMA's structure. While the broad federal standards of CZMA have found their way into more specific state and local strategies, and local communities are able to set the pace for federal and state actions, there is a fundamental disconnect when the government encourages the production of plans but then fails to link its implementation to urban growth mechanisms. It is urban growth, after all, which is one of the root causes of decline to urban coastal wetlands.

Urban coastal wetlands also wrestle greatly with the impacts of non-point source pollution. The impact of non-point source water pollution in coastal areas was finally recognized and addressed in amendments to the CZMA which incentivized the production of non-point source pollution plans utilizing CZMA's flexible, standards-based model. Federal funding was intended to be attached to the approval of non-point source coastal management plans; however, this funding was severely inadequate.[40] The 1990 amendments to the CZMA in Section 6217 required states with coastal zones to develop and implement non-point source pollution control plans.[41] The penalty for failing to submit an adequate plan would be the federal

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[39] *Id* at 229-230.

[40] Sarah Brull, *An Evaluation of Nonpoint Source Pollution Regulation in the Chesapeake Bay*, 13 U. BALT. J. ENVTL. L. 221, 235-6 (2006).

[41] *Id*.

withholding of coastal management funds, as well as state funding for Section 319 of the Clean Water Act. Coastal states are required by CZMA to implement their non-point source pollution plans even if their coastal waters already meet water quality standards. Congress added Section 6217 to CZMA specifically because it was disappointed in state participation under the Clean Water Act's non-point source planning provisions (Section 208).[42] In practice, however, Section 6217 is still voluntary; the threat of withholding funding (as with Section 319 of the Clean Water Act) is a paper tiger, as the CZMA was severely underfunded and cannot cover the cost of implementation. "Even those states that are enthusiastic about implementing a Section 6217 program may find that it makes financial sense to withdraw from the federal coastal management program rather than comply with the letter of the statute."[43] Furthermore, the amendments have not been enforced; the federal government has not withheld funds from any state, even though only a handful have submitted approvable non-point source pollution plans.

B. The Clean Water Act

The Clean Water Act (CWA) has worked methodically since its modern inception in 1972 to stem the impacts of direct pollution into the nation's waters. Unlike the CZMA, the CWA has a centralized federal structure, under which the federal Environmental Protection Agency promulgates regulations and primary policies associated with CWA; these federal initiatives are then delegated to state programs, which have little latitude in their implementation and enforcement. The CWA is far more effective in controlling site-specific outfalls at defined release points then in the curbing non-point source pollution. However, the need for non-point source pollution is great within urban coastal areas, as "according to the EPA, 44% of the country's estuarine square miles are impaired, with urban runoff, municipal point sources, and storm sewers as the primary sources of degradation."[44]

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[42] *Id.*

[43] *Id.*

[44] Charles P. Lord, Dr. Eric Strauss, Aaron Toffler, *Natural Cities: Urban Ecology and the Restoration of Urban Ecosystems*, 21 VA. ENVTL. L.J. 317, 365 (2003) ("Each of the Clean Water Act's central elements can be or has been modified such that it can be an effective tool in the fight to restore urban ecosystems. However, adequate data to support these unique and creative applications of national regulatory tools is necessary." *Id.*)

The National Pollution Elimination Discharge System is the backbone of the CWA's attempt to use a permit-based control model for pollution from "point sources" which include sewage and industrial outfalls, but also, according to judicial interpretation, channelized stormwater runoff, certain construction sites or certain filled wetlands.[45] CWA has also traditionally taken an expansive jurisdictional view of "navigable waters" to include many tidal zones, wetlands and connected bodies. As in New York, in many states, the federal NPDES power is delegated to the state level. CWA is a classic "command and control" law regarding direct, point-source pollution, and a combination of government enforcement and citizen suits has generally resulted in improved water quality. As few geographic areas have produced specific water quality standards, CWA permittees generally utilized Best Available Technology in reducing outfall contamination. However, the CWA alone is not a useful strategy for urban areas as these areas may contain a large number of outfalls, and permit grantors have a tendency to examine each discharge individually, rather than a regional watershed-wide strategy (reading all the permits together).[46] While EPA has committed, in 1994, to integrating its NPDES program within a Watershed Protection Approach (addressing all water sources together), this commitment has not necessarily trickled down to change the NPDES structure within urban communities. EPA has also expanded its CWA coverage under the NPDES program to encompass certain municipal sewage facilities with separate storm sewer systems (requiring the development of storm water management plans), as well as certain construction activities; this "provides an explicit regulatory link between landscape management and water quality."[47] This expanded program also features a number of model local programs for outreach and education (ranging from encouraging riparian landowner practices to strategic land acquisition). However, the success of this approach is questioned, as it relies upon a uniform, top-down federal approach to localized issues.

The water standard (TMDL) program illustrates the potential disconnect between federal dictates and local action, as it attempts to set water quality standards for specific water bodies, as well as a daily maximum of release quantities.[48] The TMDL program attempts to regulate many point sources – as well as non-point sources - which find their way into stormwater outfalls; these sources include runoff from roads, roofs or driveways, erosion from sediment activities, and lawn pesticides. This attempt to regulate these

[45] *Id*.
[46] *Id* at 365.
[47] *Id* at 372.
[48] 26 U.S.C. 1313(d) (2007).

sources potentially infringes upon activities typically regulated by local and state agencies, and the EPA's federal authority in this area is somewhat unclear, as it has the potential to dictate very localized decisions. One commentator notes that

> It is interesting to ask what recourse EPA has, assuming its authority to enforce TMDL standards, if a state refuses to cooperate or fails to do an adequate job of preventing the nonpoint source pollution of waters that are designated as impaired under the TMDL program. Hypothetically, EPA could assume the state's role, classify its waters, and issue, condition, or deny permits for proposed land uses under a pollution prevention system of federal design. Because of the cost and controversy involved in making EPA responsible for the regulation of nonpoint source pollution, this threat may be illusory.[49]

These tension indicate that CWA's direct point source regulations are ill-suited for regulation of land use at a local level; it is more likely that local law itself may provide the best answer to the challenges of non-point source pollution. Section 208 of the Clean Water suggests the framework for federal funding of state non-point source planning or management programs; funding was meager at best, and has long since vanished.[50] Finally, Section 404 of the Clean Water Act grants jurisdiction to the U.S. Army Corps of Engineers to grant permits for dredging or filling in wetlands; without investigating the complex nature of the Corps' permit program, it is best stated that the permits would generally be for direct impacts of wetland areas (and not necessarily for many upland watershed development programs).[51] Certainly, Section 404 is a useful tool for

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[49] John R. Nolon, In Praise of Parochialism: The Advent of Local Environmental Law, 26 HARV. ENVTL. L. REV. 365, 369-370 (2002). *See also* Victor B. Flatt, *Spare the Rod and Spoil the Law: Why the Clean Water Act Has Never Grown Up*55 ALA. L. REV. 595 (2004) noting that "pollution from non-point sources is, in theory, definitively regulated through the Total Maximum Daily Load ("TMDL") program, which tellingly has been one of the biggest failures in the CWA." *Id* at 597.

[50] Jeffrey G. Miller, *The Supreme Court's Water Pollution Jurisprudence: Is the Court All Wet?* 24 VA. ENVTL. L.J. 125, 146 (2005). *See also* 33 U.S.C. 1288 (2000).

[51] Michael J. Mortimer, *Irregular Regulation Under Section 404 of the Clean Water Act: Is the Congress or the Army Corps of Engineers to Blame*? 13 J. ENVTL. L. & LITIG. 445 (1998). ("No effective inquiry into the wetland goals of Congress can rely on the FWPCAA of 1972 due to the barrenness of the legis lative history of this law regarding the term "wetland" or mention of the protection of wetland functions. Reasonableness, suggests the 93rd Congress in passing the FWPCAA, did not con template the importance of wetlands and certainly not wetland functions. While some have argued that indeed the 1972 Act was implemented to protect wetlands, the argument has been made

preventing against the direct destruction or filling of urban coastal wetlands. Despite this potential, local environmental law has been, at best, a cursory academic treatment.[52]

C. New York Tidal Wetlands Act

The New York State Tidal Wetlands Act of 1973 was enacted to provide the state with "command and control" authority over development which may impact coastal wetlands.[53] Specifically, all development within 300 feet of the landward boundary coastal wetland area must seek a permit from the New York State Department of Environmental Conservation; in New York City, this area was limited to 150 feet. The Act was created to "to preserve and protect tidal wetlands, and to prevent their despoliation and destruction, giving due consideration to the reasonable economic and social development of the State."[54] The Act distinguishes several ecological zones within coastal or tidal wetlands, including adjacent areas, coastal fresh marsh, intertidal marsh, bars and flats, littoral zone, high marsh salt meadows, and formerly connected wetlands; the act note that these subzones have different degrees or rankings of value within a total ecosystem. The Act regulates dredging, excavation, dumping, filling, construction of structures and roadways, "any form of pollution," and "any other new activity within a tidal wetland or an adjacent area which directly or indirectly may substantially alter or impair the natural condition or function of any tidal wetland."[55] The Act permits the continuance of existing lawful activities or uses, and breaks down a wide variety of social uses or construction activities which do require permits into approximately 57 subcategories of presumptively compatible or incompatible uses.[56] The Act also provides specific design guidelines for the setback of certain uses, such as septic tanks.[57] Permits which are granted within and adjacent to

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retrospectively. There is no legislative discussion of wetlands prior to enactment of the FWPCAA where one might logically expect a statement of such intent to reside. Wetland protection advocates instead rely on a 1972 House Report mentioning ecosystem sustenance to support the specific protection of wet lands as a legislative goal. 26 However, the simple absence of spe cific text, discussion or debate regarding wetland function or import prior to the law's passage is prima facie evidence that the FWPCAA was not designed as a wetland protection law. This is of course not to say that it did not serve as one." *Id* at 452.)

[52] Nolon, supra note 49, at 374.

[53] N.Y. ENVN. CONSV. LAW Article 25 (2007).

[54] 6 NYCRR 661.1 (2007).

[55] 6 NYCRR 661.4(ee) (2007).

[56] 6 NYCRR 661.5 (2007).

[57] 6 NYCRR 661.6 (2007).

the wetland must evidence that such activity is compatible with wetland preservation goals and is within a compatible category; slightly different standards distinguish adjacent activity.[58] Existing development may be repaired, restored or rebuilt without having to seek a permit. Minor projects, such as the construction of small docks or single family homes in an adjacent area, are deemed "minor projects" and have an expedited permit review process.

The State Tidal Wetlands Act is a classic example of a "command and control" model; it provides for an additional permitting step outside of the municipal building permit process, and does not promote a positive set of design elements (rather just noting a narrow list of what is forbidden). The State Act is an interesting tool in that it addresses the potential adverse impacts of development; however, it concentrates upon the immediate shoreline, and thus cannot address the far greater impacts of watershed runoff. It is interesting to note that the jurisdictional area is limited even greater within New York City. In addition, anecdotal evidence indicates that the act relies upon the very limited enforcement budget of the state environmental agency, meaning that some violations could exist indefinitely.[59]

D. Local Land Use Laws

While localized land-use mechanisms (usually granted through a state enabling act) are not created with the specific purpose of protecting coastal wetlands, they nonetheless present the potential for great influence over many of the non-point stresses which occur in upland watershed areas. Land-use mechanisms may have an impact by virtue of integrating a broad variety of public purposes into the design of development; more than the "command and control" approach in the CWA, local land use laws have the potential to integrate future urban growth and environmental protection.

Speaking of the need to reform traditional zoning laws to better incorporate contemporary community needs, one commentator noted that "if you want to make your community better, begin at once by throwing out your zoning laws. Get rid of them. Throw them away. Don't revise them. Set them on

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[58] 6 NYCRR 661.9 (b) and (c) (2007).

[59] Press Release, Jan 31, 2001, New York State Attorney General. "State Resolves Jamaica Bay Wetlands Violation $1.3 Million Settlement Includes Creation of Jamaica Baykeeper To Protect Waterway" available at http://www.oag.state.ny.us/press/2001/jan/jan31a_01.html (the violation, construction of an unpermitted dock and pool, had existed since 1989; the settlement allowed for the continued existence of the construction for its natural life).

fire if possible and make a public ceremony of it – public ceremony is a great way to announce the birth of a new consensus."[60] This statement evidences the fact that, although zoning was historically enacted to reduce nuisances and harmful congestion, it has resulted in a formulaic approach to land development which encourages urban sprawl and fails to account for the ecological impact of new construction. However, local land use tools offer a wealth of opportunities to build ecological protection.

> Environmentalists are now looking toward revising and rewriting zoning codes to create more sustainable, healthy environments. Further, there is a movement towards providing a sound ecological basis for zoning decisions. Although environmental concerns are not the primary focus of zoning today, this movement can be seen as the natural extension of the environmental concerns upon which the first zoning decisions were based.[61]

Unlike the centralized federal model of environmental law, local land use mechanisms are not plagued by the meager budgets or low enforcement capacity which often plague government agencies exclusively dedicated to environmental issues; rather than having natural ecology and urban development work at cross purposes, land use tools "mainstream" environmental issues into other regulatory frameworks.

Land use mechanisms provide for a wide variety of methods to integrate ecological protection into growth strategies. On the largest scale, a local comprehensive or long-term growth strategy can address and incorporate concerns over development in sensitive areas. However, these plans more frequently offer mere visions or goals of the future; they are implemented by tools at several levels. The primary and traditional implementation tool of land use has been zoning, which places valid limits on property use or building form provided that the restrictions are related to a valid and expressed public purpose (centering around public health, safety or welfare). Zoning is notable as it controls density over a geographic area, and could reduce density in sensitive areas (which has co-benefits of reduced impervious surface and sewage capacity); strategic or creative zoning mechanisms may also have additional design guidelines. These include the use of overlay zoning mechanisms which ensure that development within specific sensitive areas may address environmental

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[60] James Kunstler, HOME FROM NOWHERE: REMAKING OUR EVERYDAY WORLD FOR THE TWENTY-FIRST CENTURY (1996) quoted in Charles Lord, Dr. Eric Strauss & Aaron Toffler, Natural Cities: Urban Ecology and the Restoration of Urban Ecosystems 21 VA ENVTL L.J. 317, 331 (2003).

[61] *Id* at 331-32.

issues: "Overlay zones use performance standards to protect environmental resources… Performance standards are criteria designed to limit the offensive by-products of land uses. Examples of these by-products include noise, odor, pollutants and runoff. These overlay zone requirements do not take the place of traditional zoning controls, but impose additional requirements on properties within sensitive environmental areas."[62] Other, more specific land use tools, including site plan or subdivision requirements, environmental impact review, and building codes may introduce a broad array of specific design tools which will reduce ecological impacts and even encourage restoration.

> In an urban area, there may not be a good deal of choice as to where to locate development, but the principles of this type of planning can be used to improve site design by integrating open space and the placement of buffers, as well as by minimizing the amount of impervious surfaces. In addition, local design codes to encourage biodiversity of different sorts… This might turn all new development into habitat islands in a sea of concrete.[63]

Local land use laws as applied to environmental issues are primarily proscriptive in that they identify and reduce negative environmental consequences before they occur; this is markedly different then traditional "end of pipe" corrective solutions. In addition, local land use laws are more than a broad statement of coastal management goals but have verifiable impacts the achievement of which is linked to profit or growth incentives.

PRIMARY CASE STUDY: THE DECLINE AND CONCERN FOR NEW YORK CITY'S JAMAICA BAY

New York City's Jamaica Bay is an excellent case study of the challenges of urban coastal wetland protection; modern urban growth has produced deep economic and ecological scars. The Bay faces a myriad of challenges to its future; these challenges have drawn the recent attention of environmental planners who have sought to define a way forward for the Bay. However, the Bay is already afforded some degree of protection by federal environmental and coastal planning laws; the current 2007 study is only the most recent in a growing line of similar planning efforts. Clearly, the attainment alone of planning goals will not be sufficient alone to protect

[62] *Id* at 338.
[63] *Id*.

the Bay against a burgeoning urban population. Much as the Bay had once served as an important source of economic vitality during its nineteenth century role as a shellfishing source, the Bay's future must once again be structured so that it is an integrated part of – rather than a victim of – future urban growth.

A. Description & History

Jamaica Bay is set to the south of the Borough of Queens, to the east of the Borough of Brooklyn, and to the west of suburban Nassau County. It is bordered to the south by a thin, densely settled barrier island known as Rockaway Beach. The Bay features a network of open water, salt marsh, grasslands, coastal woodlands, marine shrublands, as well as brackish and freshwater wetlands. It features 91 species of fish, 325 bird species, in addition to reptiles, amphibians and small mammals.[64] Notably, it is a stopover area for migratory birds "and is one of the best bird watching locations in the western hemisphere." It also features 214 species of concern. Over 9000 of its 16000 acres have been designated by the New York State Department of State as a Wildlife Refuge, and it is also a part of the federal Gateway National Recreation Area, run by the National Park Service. It is also rapidly degrading; the estuary is half of its colonial-era

[64] New York City Department of Environmental Protection. JAMAICA BAY DRAFT PROTECTION PLAN DRAFT (March 1, 2007) V1 at 1. available at http://www.nyc.gov/html/dep/html/jamaica_bay.html *see also* Gateway National Recreation Area Jamaica Bay Unit The Evolving Legacy of Jamaica Bay (2005) available at http://www.vanalen.org/gateway/sitebrief_downloadables/Primary_Sources/11_Evolving_Legacy_Jamaica_Bay_NPS_2005.pdf; E. Hartig and V Gornitz, *The vanishing marshes of Jamaica Bay: sea level rise or environmental degradation* Goddard Institute for Space Studies (2002) at www.giss.nasa.gov/research/ intro/hartig_01/.; *Marshes vanishing at Jamaica Bay*, NATIONAL PARKS CONSERVATION ASSOCIATION MAGAZINE, (May-June 2003) at www.npca.org/ magazine/2003/may_june/news6.asp; New York State Department of Environmental Conservation, STRATEGY FOR ADDRESSING LOSS OF INTERTIDAL MARSH ON THE MARINE DISTRICT (2003) at www.dec.state.ny.us/website/ dfwmr/marine/twloss.html; New York City Local Law 71 (2005) at http://nbii-nin.ciesin.columbia.edu/jamaicabay/jbwppac/law05071.pdf; Shumon et al JAMAICA BAY: A STUDY OF MORPHO-DYNAMICS AND PROBLEMS OF EROSION AND FLOODING. (2003) Columbia University of New York at http//:everest.cuny.edu/~bshumon/images/jbay_co ntentd.html; S. Trimel, *Columbia study shows wetlands disappearing near Kennedy Airport*, Earth Institute News at Columbia University April 4, 2002. at www.earth.columbia.edu/news/story04_04_02.html.

size, and salt marsh wetlands are being lost at an alarming rate. The Bay holds a critical function for its diverse habitat, recreational use, aesthetic viewshed, flood control, infrastructure protection, and pollutant attenuation or filtering.[65]

The Bay watershed includes densely-settled portions of the New York City Boroughs of Brooklyn and Queens, as well as portions of nearby suburban Nassau County. The watershed includes approximately 91,000 acres of urban settlement; relatively few residents or developers in that area are aware that they are within a watershed. [66] Primary land use within the watershed is residential, commercial and industrial, as well as landfills, parks and the JFK International Airport (located on the eastern edge of the Bay). The Bay serves as the City's largest estuarine waterbody and covers over 16,000 acres (including 3,000 acres of islands marshes).[67] It is connected to the nearby Atlantic Ocean through the Rockaway Inlet and has a tidal range of approximately 5 feet. The mean depth is 13 feet, with depths reaching between 30 to 50 feet in certain dredged areas and navigation channels.

The Jamaica Bay watershed development is primarily one and two story family residential homes, but is thickly settled with impervious coverage at approximately 65% of the surface; approximately 41% of the watershed is zoned as low residential density, and 22% is zoned as medium residential density.[68] Industrial land use is at approximately 2% of the watershed land (although 15% is zoned as a manufacturing zone), with open space and recreational facilities constituting 22%.[69] The area also contains special use zoning districts, with design characteristics intended to preserve or promote distinctive qualities; these areas include a waterfront zone designed to improve waterfront recreation. In 1993, special zoning regulations were adopted for development of waterfront areas, which controlled the use of piers and other water-based structures, and mandated public access as well as viewshed preservation.[70] The Bay is designated as a Special Natural Waterfront Area under the New York City Planning Department's Waterfront Revitalization Program, a primary coastal zone management tool.[71] Under the designation, proposed projects along the Bay's edge are

[65] *Id.*
[66] *Id* at 14
[67] Id
[68] *Id* at 101.

[69] *Id.*
[70] *Id.*
[71] *Id.*

reviewed for conformance with ten policies with the purpose of protecting coastal ecology.

The Bay also bears a human footprint, as many wetlands or islands have been lost due to filling operations, shorelines have been hardened to protect existing human communities, deep channels have been dredged, and natural tributaries have disappeared (with fresh water replaced by urban runoff). [72] Human activities have altered the flow patterns, impacted habitats and water quality, and generally changed the rich pre-development ecosystem.[73]

The Bay was originally used by the tribal Lenape nation as a shellfishery as well as fishing grounds, with a nearby dry land settlement.[74] The first modern-era settlement of the Bay was an 1833 hotel, the Marine Pavilion, which was built on marshes which were filled with Bay sediments from dredging operations to ensure boat access.[75] The Pavilion was a harbinger, as in the next two centuries numerous actions would expand the human footprint upon the Bay's resources. Some of the Bay was used during the late 19th century as a fertilizer plant, and several islands were expanded with fill to expand the mainland. Artificial bulkheads placed along discrete areas, which subsequently led to localized island erosion. [76] Early attempts in the early 20th century to make the Bay useful by commercial boats. Although a few projects were undertaken, the growth of readily available ports elsewhere led to the abandonment of the Bay as a commercial center. As nearby areas settled, the Bay began to feel some impacts of the expanding human footprint, and shoreline erosion increased. In 1964, the federal Board of Engineers and Harbors conducted a study which identified several structural measures to reduce erosion, including levees and a stone hurricane barrier.[77] Watershed development occurred rapidly throughout the 20th century, as there was little well-developed ecological knowledge of watershed management.

In 1938, Robert Moses wrote to the Mayor decrying a 1922 plan to turn the park into an industrial port, and suggested that the Bay and environs be rezoned, and that all of the islands should be transferred to the domain of the New York City Parks Department, for recreational purposes and scenic protection. In addition, the transfer called for Parks to complete the

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[72] *Id* at 3.
[73] *Id.*
[74] *Id* at 14.
[75] *Id.*
[76] *Id.*
[77] *Id* at 12.

"'purification of the polluted waters of the Bay"[78] Despite Moses' suggestion, few controls were ever placed on watershed development until recent planning efforts. The changes to the coastal marine ecology are evidenced through geographic alterations; wetland islands have been removed, shorelines have been reconfigured, water flow has been rearranged and tributaries have become clogged with silt due to an extensive tradition of dredging, filling and proximate development. [79] These geographic alterations have had a critical ecological impact.

B. Contemporary Ecology

Tributary alteration has posed a particular threat to the Bay; its fresh water sources are now almost entirely combined sewer overflows (which release untreated sewage during flooding), storm sewers and other wastewater pollution. Most of the Bay's eight primary tributaries have been physically altered by dredging, the use of bulkheads, or narrowed. Few tributaries resemble their original courses or water quality character.

The water quality and character of the Bay has been impacted by development in and around the watershed. Primary causes of diminished water quality includes Combined Sewer Overflow (CSO) systems which release untreated sewage during high-capacity periods, sewage treatment plants which release treated outflow waters likely to still have a high concentration of nitrogen or low oxygen, storm sewers with urban runoff from street surfaces, landfill leachate, rainfall, and tidal exchange of water.[80] The quality varies throughout the Bay, and several of its tributaries, as well as portions of the Bay, are classified as appropriate for recreational use (including swimming and fishing). Higher than normal nitrogen concentrations, attributable to sewage treatment plants, have contributed to lowered dissolved oxygen levels within the Bay. [81] The Bay also experiences localized high concentrations of pathogens (likely a result of fecal coliform attributable to untreated sewage), and high chlorophyll concentrations (which indicate a high level of algae). [82]

The Bay's water quality problems have not gone unnoticed, however. The New York City Department of Environmental Protection, which is charged with overseeing sewage discharges, has addressed this issue with several

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[78] *Id* at 13.
[79] *Id.*
[80] *Id* at 29-32.
[81] *Id.*
[82] *Id.*

facility plans which address specific water quality deficiencies.[83] These projects include sewage treatment facility upgrades, CSO reduction facilities, landfill closures and restoration projects.

Some of these plans respond to a Nitrogen Control Order on Consent signed with the state Department of Environmental Conservation, which updated SPDES permits for the four sewage plants, with the goal of reducing nitrogen discharges.[84] The SPDES permits presently establish two types of limits on nitrogen, a maximum monthly average and a 12-month rolling average limit; these are related to the present capacity of existing plants. DEP was also required by this order to submit to DEC a "Comprehensive Jamaica Bay Water Quality Plan" which it submitted in October, 2006. The plan includes conceptual designs for treatment options at each of the four sewage treatment facilities; these treatment options address different effluent outflow levels and costs. The plan also examined non-treatment alternatives, including recontouring and aeration. [85] DEP is also subject to a long-standing administrative consent order regarding its combined sewage overflow program, in which it is required to implement abatement projects at key areas where dissolved oxygen and coliform standards were exceeded, and in key areas where floatables control was needed.[86]

The City is also itself part of the Bay's ecology; in upland areas "concrete and asphalt occasionally give way to sparsely vegetated developed areas such as small city parks, tree-lined streets, backyards and abandoned lots. Interestingly, graveyards and landfills provide some of the largest "open" spaces in the watershed."[87] In spite of the built environment, uplands still host connected vegetation and species.

The aquatic environment includes brackish or marine water areas, including tidal open estuarine water, as well as freshwater features, including lacks, ponds and streams. The upper watershed is densely settled, and, as a result, "almost 100% of the freshwater tributaries to Jamaica Bay have been piped" from upland areas and the freshwater contribution "is a small fraction of its historical extent."[88] Accordingly, the freshwater ecosystem and associated biological communities within the watershed has largely collapsed. The vast majority of the freshwater in the Bay comes out of sewage outfalls.

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[83] *Id.*
[84] *Id.*
[85] *Id.*
[86] *Id.*
[87] *Id* at 69.
[88] *Id* at 53.

The corresponding increase in nitrogen has greatly stimulated "aggressive non-native plants, phytoplankton and macro-algae 'blooms.'

To illustrate the degree to which the urban environment has altered the wetland, before 1800 the Bay was about 3 feet of average depth, with a surface area of about 25,000 acres; draining, filling and dredging has reduced the Bay to a size of about 13,000 acres, with an average depth of 16 feet.[89] The overall water volume of the Bay has increased by 350%.[90] A primary cause for this expansion was the creation of "borrow pits" as deep areas which were dredged for fill material to expand the shoreline zone for nearby settlements and, notably, JFK International Airport. Localized areas of the Bay are virtual "dead zones" at which the dissolved oxygen level has fallen below the US EPA threshold for support of living organisms. Borrow pits may act as "sediment sinks" which trap sediment that formally washed onto salt marshes. Wetland loss, including salt marshes, is likely attributable to many factors, including a lack of sufficient sediment, wave erosion, stratified water, and biological growth associated with nitrogen levels. A high panel of wetlands ecologists concluded in 2000 that "numerous interrelated processes are responsible, including changes in sediment deposition, increased wave action, contamination of Bay waters and sea level rise."[91] The panel also noted that the rate of loss was accelerating.[92] Dredging has also tripled the amount of time in which tidal flows would help wash or cycle pollutants out to the diluted ocean (the cycle is currently 33 days, whereas historically it was 11 days).[93]

Sea level rise associated with climate change will threaten the Bay's ecological health. Nearby monitors indicate a small rise currently at approximately 3 millimeters per year since 1961. This rate of sea level rise is compared to a mean rise of 1.8 millimeters from approximately 1900 to 1961. These estimates predict the sea level rise at the Bay to reach a rate of between 2.7 and 7.3 millimeters by 2020, and between 2.7 and 13.7 millimeters by 2050.[94] It is interesting to note the correlation between the rising rates of sea level rise and the rising rates of wetland decline within the Bay; however, there are likely multiple factors contributing to this loss (including erosion and storms). Small changes to the physical geography

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[89] *Id* .
[90] *Id.*
[91] *Id.*
[92] *Id.*
[93] *Id.*
[94] Hartig et al , A WETLANDS CLIMATE CHANGE IMPACT ASSESSMENT FOR THE METROPOLITAN EAST COAST REGION (2000) at 9 available at http://metroeast_climate.ciesin.columbia.edu/reports/wetlands.pdf.

have a large ecological echo, however, and climate change impacts could have a dramatic – and negative – impact on the B ay. "If wetland surface accretion is not sustained with the pace of SLR [sea level rise], there is a concern that the remaining salt marsh wetlands in Jamaica Bay will vanish in a few generations' time."[95] Even if there is a dramatic reduction in greenhouse gas emissions, the current rate of sea level rise will likely double within the next century, and current estimates indicate that the sea level will increase by between 4 inches and 18 inches by 2050. Climate change will result the increased loss of wetlands due to wave erosion and tidal inundation. The spread and increase in saltwater mix will impact tidal and estuarine species. While coastal wetlands adapt to ecological change through landward migration, this is not an option in urbanized areas where the coastline is already populated or features hardened structural barriers. With nowhere else to go, wetlands will have little alternative but to slowly erode. Certain adaptation strategies, such as the establishment of inland buffer zones to allow for wetlands migration, are promising but also pose conflicts within urban areas with existing populations. It is interesting to note a proposal which would allow for "rolling easements" which would allow for current shoreline development, but would prohibit the future construction of seawalls, rip-rap or other "hard armor" structures; "thus as the sea comes inland the regulated wetland area would roll back landward."[96] However, such a proposal would have to fundamentally define ownership rights, and would present a serious political challenge.

In addition, the introduction of "historic fill" and non-native soil characters within the surrounding watershed has had a serious ecological and hydrological impact; materials include dredged sediment, municipal waste and incinerator ash.[97] Historically, Jamaica Bay's shoreline has been framed with salt marshes. These shoreland areas absorbed wave energy and prevented erosion. Dredging, which deepened the Bay, created a higher wave height which, when coupled with the loss of salt marshes due to other ecological or development factors, has worsened erosion.[98] Whereas prior to modern settlement, the Bay had about 16,000 acres, by 1971, only about 4,000 acres remained. Loss prior to 1971 was explained as a direct – and obvious – result of dredging, filling and draining. Loss since 1971 is more complex, and has not been full explained. From 1924 to 1974, the rate of loss was approximately .4% per year; since 1974, the rate of loss has more

[95] New York City, supra note 57, at 53.
[96] Hartig, supra note 90, at 30.
[97] New York City, supra note 57, at 25.
[98] *Id.*

than tripled to 1.4% per year (about 44 acres/year – nearly 1 acres per week). The rate of loss from 1994 to 1999 increased to 3%.[99]

Human activities, primarily CSO and sewage treatment releases, as well as dredging or filling, have contributed to poor sediment quality; the character of many of the Bay's sediments is typically associated with adverse impacts to marine benthic ecosystems. In addition to harmful organic carbon concentrations, multiple trace and heavy metals are present in sediments, including cadmium, chromium, copper, iron, lead, mercury, nickel, zinc, chlordane, DDD, DDT, dieldrin, heptachlor and PCBs.[100] These elements were found in greater concentrations closer to sewage treatment releases, CSO releases, storm sewers, or landfills. Concentrations in portions of the Bay of mercury, chlordane, and high molecular weight polynuclear aromatic hydrocarbons exceed established standards, beyond which adverse ecological effects may occur; sediment sampling in the 1990s found that the Bay had some of the highest toxicity levels in the New York Harbor area[101]. These concentration may be related in part to releases of toxic contaminants which preceded the 1972 Federal Clean Water Act.

C. The Bay Plan

The Bay has recently been the subject of a wide scale planning effort conducted by the New York City Department of Environmental Protection (DEP, the local city agency in charge of water, sewage, and other environmental initiatives). The plan was released in draft form in late March 2007. The plan was created by Local Law 71 which required the DEP to evaluate the technical, legal, environmental and economical feasibility of a variety of potential protection measures.[102] The bill would conclude with a comprehensive watershed planning approach which would ensure water quality and ecological stability of Jamaica Bay.[103]

1. Earlier Planning Efforts

The earliest ecological restoration and conservation efforts in the Bay were aimed at protecting shellfisheries impaired directly by industrial

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[99] *Id* at 59.
[100] *Id*.
[101] *Id*
[102] New York City Local Law 71 (2005) at http://nbii-nin.ciesin.columbia.edu/jamaicabay/jbwppac/law05071.pdf;
[103] *Id.*

contamination and untreated urban sewage.[104] Later efforts realized the importance of wetlands habitats, and attempted to limit landfills and restore wetland areas; these efforts were not fully able to overcome degraded water conditions or stem the impacts of the large-scale wetland loss. Current efforts include the designation of City and State parkland, which has now largely completed purchase of available open space. Numerous natural resource and wetlands restoration have also been recently sponsored by the National Park Service, the Army Corps of Engineers, the City Parks Department, and the City Department of Environmental Protection. Some of these projects also address water quality or habitat issues.

In 1905, a proposal was put forth for the Bay to "reclaim what is practically waste land and water' into a major port for commerce.[105] The proposal resulted in dredging of the Bay for recreational boating purposes, bulkhead construct to stabilize the shoreline, and the construction of many piers and docks for private recreation boats. [106] More recent projects have included "a myriad" of technical investigation, analysis and government studies. "It may be literally impossible to identify every investigation, study or evaluation program that has been conducted." An analysis of these plans includes the following:

- A 1993 study by the state Department of Environmental Conservation, which included over 55 potential projects. "Several notable projects implemented."
- A 1994 Comprehensive Management Plan by the City Department of Environmental Protection, which weighed a range of ideas for engineering, issues/policy, and ecosystem recreation.
- A 1997 Army Corps study identifying primary restoration sites.
- A Comprehensive Conservation and Management Plan in 1997 developed by the NY/NJ Harbor Estuary Program under Section 320 of the Clean Water Act, which provided long-term and intermediate strategies to protect habitat and conduct restoration activities.
- A 2001 Panel study to recommend pilot projects for addressing marsh loss and sea level rise.
- Site Restoration studies in 2003 and 2004

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[104] *Id.*
[105] *Id* at 119.
[106] *Id.*

A 1992 Citywide Comprehensive Waterfront Plan created a harmonized approach to waterfront areas, including addressing natural, public, industrial/maritime and redevelopment needs. Two borough plans subsequently produced identified recommendations to limit dredging to established channels, examine shoreline erosion, illegal dumping notification signage, and designation of the Bay as a mapped Special District. In addition, the plan recommended containment plans for closed landfills, an interagency task force, visitor impact planning, and waterfront redevelopment (although "some of these projects have been locally controversial for their impact on the waterfront.")[107]

The New York State Department of Environmental Conservation's 1990 Critical Environmental Area designation is afforded to unique areas and heightens the level of environmental review for proposed projects; this designation area is limited only to the high tide line. As early as 1992, a report noted that while the Bay was already a designated area, "arguments have been made for the extension of the CEA designation to the Bay's contiguous vacant uplands" which currently only receive protection if they are proximate to wetlands.[108] Such arguments are compelling given both the research regarding upland impacts, and the statistic that, currently, only 14 square miles of wetlands remain out of an original 100 square miles.[109] However, given the population density targets for the upland area, these potential restrictions would be controversial, and could have a dramatic impact upon both economic development as well as ecological protection. The present designation is considerably more anonymous and relatively ineffectual.

In general, previous planning efforts to protect Jamaica Bay have been well-intentioned but fragmentary. Many plans have focused primarily upon ameliorative structural projects; the implementation of these projects appears to have been somewhat haphazard and limited. Relatively little planning attention has been given to either substantially the impact of nearby upland human development, or to the challenges in implementing these policy options. Without an ability to link urban growth and ecological protection, Jamaica Bay will continue to be pulled in two opposite directions.

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[107] *Id* at 122.
[108] *Id* at 127.
[109] *Id* at 128.

2. 2007 Planning Effort

The planning framework used for the most recent planning effort, in 2007, utilizes an overarching consensus on goals as a means to support a wide web of "potential" identified alternatives and policy option. Each management strategy presented in the menu will be further analyzed for selection and implementation.

The plan first notes the complexity of water quality within the Bay, stating that the water quality results from a complex, if not indivisible, combination of landfill operations along the perimeter and in the upper watershed, increasing watershed human populations (and increased solid waste and sewage), dredging operations, westward extension of the Rockaway barrier island to the south, habitat displacement and other factors.[110] The plan also describes challenges in public access (due to dense perimeter development), land use impacts (including stormwater control), and outreach barriers.[111] These challenges are translated into a series of broad objectives, and presented in an ecosystem model which identifies the root sources of environmental stress, relates these sources to resultant ecological impacts (erosion and degraded habitats), and then relates the impacts to limitations on human uses (toxic shellfish, poor access/recreational use, loss of aesthetic value and health hazards.[112]

Regarding water quality, the Plan notes the need for improved stormwater management practices in the context of both "off site" control (primary facility treatment before release), and "on-site" control (including the increased use of pervious ground space to increase absorption). [113] The Plan discusses the potential for vacant public lands to be converted into stormwater run-off filtration or storage areas to filter pollutants and reduce volume. The plan proposes increasing tree cover and utilization of transportation networks as opportunities for improved stormwater design. As a means to address sewage (and accompanying nitrogen levels), the plan proposes implementation of end-of-pipe nitrogen removal technologies (including scrubbers and artificial wetlands) to absorb releases, as well as algae removal and "decentralized" technology for sewage treatment.[114] The plan also recommended evaluating tributary basins which would benefit from structural restoration (such the direct introduction of higher oxygen

[110] *Id* at V2, 8.
[111] *Id.*
[112] *Id* at 10.
[113] *Id*.
[114] *Id.*

content, the removal of raw sewage sediment mounds and restoration of previously-dredged areas). The introduction of structural restoration, as well as higher oxygen content, known as aeration, was also proposed for discrete areas of the Bay itself (including dead zone deep pits). The contribution of sewage was addressed through proposals to monitor interconnections between sanitary and (overflow) storm sewers within the watershed, improved catch basins to remove floatables at outfalls, in addition to enforcement of existing solid and maritime waste programs. The plan also addressed the need for increased enforcement to reduce the loading of toxic contaminants into the Bay, tributaries and groundwater, as well identifying additional best management practices which could be used by existing industrial entities to reduce pollutant discharge.[115]

Regarding the diminished ecology and loss of salt marshes, the plan proposed restoration or reinforcement (moving forward even as the more precise cause of salt marsh loss is identified). Ecological restoration would be accomplished by a wide range of potential initiatives, including reuse of appropriate dredged material, use of emerging technologies to protect marsh islands from wave and wind erosion, as well as enhanced funding for monitoring and enforcement. The plan also proposed the removal of existing invasive, non-native vegetation, in both wetlands and upland areas (as a means of soil restoration). Land management recommendations included the potential acquisition of the few remaining wetland parcels in the watershed. The plan also discussed a wide range of localized vegetation, landscape, habitat and marine restoration projects. [116]

Regarding public access and recreation, the plan addressed the limited public access to the Bay by recognizing the need to integrate recreation with ecological protection. The plan proposed multiple strategies for increased access points and increased public amenities (such as programming, walkways and boat launches). In addition, the plan proposed "branding" the Jamaica Bay watershed name as a means of raising public awareness (noting successful efforts such as the Chesapeake Bay Foundation's "Save the Bay" campaign). [117]

In addressing the watershed development and land use issues, the study noted the potential for a zoning requirement to require that a specific percentage of lots be maintained as pervious space for new development; predictive modeling could predict the extent by which runoff would be

[115] *Id* at 12.
[116] *Id* at12-20.
[117] Id at 20.

reduced. However, the study also noted that "an assessment will be made to determine if such a requirement would be feasible, given site constraints in a densely populated urban area."[118] In addition, restrictions could be introduced on parking structure designs or prevention of paving over of lawn areas or other new impervious spaces within existing development. Additional measures discussed included the introduction of permeable driveway or surface parking designs, "green" site or building design strategies to enhance on-site use or management of stormwater, and revision of sewer codes, drainage plans or building codes to encourage the use of enhanced stormwater management techniques. [119] The plan also discussed the utility of incentive programs (rather than regulatory restrictions) as a means of encouraging "green" development. Existing green building strategies which are centered around energy conservation could be retooled to include stormwater management. The economic value of open space or low impact development within the watershed could also be increased by information dissemination; the plan notes that:

> Environmental regulations, typically used by governments to protect environmental resources, are often seen as being "unprofitable" to businesses and property owners. For environmental protection and sustainability to become truly integrated into the City, it is necessary to demonstrate that these can also be economically viable. In fact, environmental protection most often makes economic sense when all the public costs are considered.[120]

While this is a compelling argument, the plan does not propose the retooling of tax or other assessment schemes. The plan also considers development strategies which encourage the preservation of open spaces in the watershed as a result of new development. For example, offset programs allow developers to fund specific environmental projects, conservation easements may be encouraged with tax incentives, and transfer of development rights programs allows conservation offsets from development projects in another district.[121]

The plan notes the need for multi-agency coordination, such as a "Jamaica Bay Collaborative" composed of federal agencies (such as the EPA, the Army Corps of Engineers, the National Parks Service, and NOAA), the state Department of Environmental Conservation, and City agencies (Department of Environmental Protection, Transportation, Design, Parks

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[118] *Id* at 76.
[119] *Id*.
[120] *Id.*
[121] *Id.*

and Planning) as agencies with jurisdiction or interest in the Bay.[122] In addition, the plan noted the potential use of specialized guidance through the City's City Environmental Quality Review (CEQR) law (which mandates environmental impact analysis for specific local government decisions or actions).[123] These guidance mechanisms could help to ensure that future development within the watershed proceeds with minimal negative impact to the Bay; while CEQR is largely a procedural statute, it nonetheless has the serious potential to actively encourage conservation-minded development actions. Actions considered under CEQR within the watershed could include guidance related to impervious surfaces, stormwater runoff capture based upon site or soil characteristics, and landscaping with non-invasive species.[124] Finally, the plan notes that funding streams are uncertain, although certain initiatives may be linked to the goals of the City's long-term sustainability planning activities.

3. Analysis of the Plan

The recent Jamaica Bay plan is both tired and compelling depending upon its particular sub-focus. Regarding structural alternative (such as limited dredging, filling, and tributary design measures), the Plan offers a variety of items with high engineering potential but little funding support. It is likely that many of these alternatives would have a positive impact upon the Bay's natural health; without a dedicated external funding stream, the Bay must rely upon the competition of its own projects against pressing social needs in the mix of annual government budgets. Accordingly, it is uncertain that these projects will be implemented at all, or on a fragmentary basis within an uncertain timeline.

The plan also discusses policy options regarding regulatory control over CSO and direct outfalls from sewage treatment facilities. However, here the plan is largely limited to a description of existing regulatory strategies (including the Clean Water Act). The plan discusses specific initiatives undertaken in response to regulatory violations or settlement consent decrees; few initiatives for direct water control are discussed outside of the Clean Water Act. However, the plan's reliance upon enforcement of existing measures indicates both that these measures have already built the most appropriate structure to reach the plan's goals, and also that the problems which plague their enforcement may ultimately lie outside of the

[122] *Id*
[123] *Id*
[124] *Id*

domain of regulatory protection. The cost associated with massive sewer system upgrades within the watershed to the point of eliminating the Combined Sewage Overflow (and other upgrades beyond existing Clean Water Act permits) would be staggering; the existing end of pipe projects will likely stem the increasing rate of water degradation (in particular nitrogen). Enforcement of existing initiatives should not be the foundation of a transformative urban plan, particularly when the existing regulatory infrastructure has inadequately protected the Bay to date. Ultimately, the vitality of the Clean Water Act as a tool in addressing direct release pollution within the Bay will come with national structural and administrative reforms which would increase its enforcement or responsiveness to specific water conditions. More importantly, the plan does not correlate a growing watershed human population with such infrastructure improvements (themselves unable to cope with existing levels of pollutants); the use of end-of-pipe upgrades alone in high-growth urban areas would result in a "cat and mouse" game in which infrastructure struggles behind population surges.

Far more promising is the Plan's discussion of a range of policy options which integrate land use and ecological protection. The plan outlines multiple alternatives which would reform existing design and decision-making tools to better serve the Bay's environmental initiatives. The plan addresses the much-anticipated future population growth by ensuring that such growth is able to also reduce existing ecological stress, and tackling in particular the complex issues of non-point source pollution. In particular, the plan discusses the potential for amending or rewriting design initiatives such as building codes, which would ensure that new construction (and certain rehabilitations of existing structures) would be required to incorporate strategies which would recycle "grey water" on site, would increase site absorption or permeability, and would reduce the amount of stormwater and sewage overflow incidents. In addition, zoning overlays and restrictions would decrease density within critical areas in the watershed; reduced density (or density concentrated within different areas) would greatly reduce contributions to the sewage load and could allow the more strategic placement of impervious surface, as well as the creation of other open space. Generally, such controls are permissible provided that they meet an expressed, valid public purpose and also leave room for growth. Further implementation of these strategies, the plan notes, can take place within the context of the City's environmental review law and site plan approval process; these flexible mechanisms help to ensure that large-scale redevelopment initiatives can enhance public access to the Bay, can implement civil engineering improvements which reduce stormwater

outflow, and can even serve as a potential funding stream for structural ecological restoration projects within the Bay. Finally, the plan notes that strategies which can streamline redevelopment of polluted brownfields within the watershed would ensure both improved groundwater or tributary outflows into the Bay, while also providing for the development of "green design" communities with reduced ecological impacts. The implementation of these strategies would have a generally transformative effect upon the Bay simply because urban growth would define, enhance and even fund ecological restoration. The primary failure of goal-oriented laws, such as the CZMA, is that they fail to provide a mechanism which firmly links goals and specific growth actions. The primary failure of result-oriented, permit-based laws such as the CWA is that they seem to be forever following human growth with delayed technical responses – due perhaps to their timing, these laws have a difficult time shaping the growth, designs and actions of the very populations which create the later, more localized impacts.

However, the plan is ambitious as it has placed a hurdle in the very heart of an area expected to experience substantial growth in the next three decades. The integration of ecological protection into design standards and land use controls appears to be the most effective means by which to protect urban coastal wetlands, but it also promises to be the most politically difficult alternative. These controls are sorely needed; growth trends in the watershed currently indicate the future as one with less open space. The Borough of Brooklyn was recently declared in an article in Science magazine to be "the most paved-over place in the United States" on the basis of a recent US Geological Survey. Marty Markowitz, the Borough President, responded to the article by noting that "we're a borough that is increasingly dwindling in terms of open space, no question."[125]

COMPARATIVE CASE STUDIES

A. New Jersey's Meadowlands

The Meadowlands tidal wetlands lie in northwestern New Jersey, within view of the midtown Manhattan skyline and close to major industrial ports. The wetlands had most recently been proposed, in part, for use as the site of the largest mall on the eastern seaboard. It is now a 8,400 acre urban

[125] *Trees? Nah, Blacktop grows in Brooklyn*, NEW YORK DAILY NEWS, May 4th 2007. available at www.nydailynews.com/news/2007/05/04/2007-05-04_trees_nah_blacktop_grows_ in_brooklyn.html

wildlife preserve. A recent federal study produced a detailed study of wetlands loss over the 20th century, and noted that the wetlands had decreased from over 20,000 acres in 1899 to slightly over 5,000 acres in 1995.[126] The study closely documented the historical rates of loss in the Meadowlands, finding that the loss rate was concentrated primarily in the period between 1953 and 1984; subsequent losses have slowed.[127] The study also discussed the Meadowlands' history, noting that earlier urban colonial settlements during the 18th century considered the salt marshes to be valuable property; local statutes were enacted to preserve the marshland and to maintain it for harvest.[128] Mosquito ditching and development preparation in the early 20th century had substantial aquatic impacts, as did the construction of a nearby reservoir in 1922. By the early 1970s, the wetlands were being filled in as a solid waste dump, with the volume of approximately 30,000 tons per week of solid waste (constituting one-third of the state's solid waste). [129] To compound this injury, the New Jersey Turnpike was constructed on top of the Meadowlands' marshes in 1971.

The initial conservation effort began in 1990 with much public skepticism over the worth of wetlands, and concluded with widespread public support thanks largely to a partnership coalition which included local municipalities, Congressmen, governors, state and federal regulatory agencies, as well as thousands of citizens. The wetlands were initially targeted for substantial development as part of a special economic development plan.[130] However, over 2/3rds of the wetlands remain in areas zoned for future development.

As a brief comparative example, the Meadowlands coastal urban wetlands case study evidences the success which can come through broad partnership coalitions, and the impact of "branding" as a means to provide a foundation through legal protection by accumulating political or social support. The impact of cooperative planning helped to turn the popular perception of the Meadowlands from a wasteland into a recognized asset. The utilization of broad coalitions and advancing positive publicity are likely to build the social support base needed to enact and enforce regulatory strategies.

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[126] Tiner et al., WETLANDS STATUS AND TRENDS FOR THE HACKENSACK MEADOWLANDS: US FISH & WILDLIFE SERVICE (2002) at 27, available at http://library.fws.gov/Wetlands/Hackensack.pdf

[127] *Id.*

[128] *Id.*

[129] *Id.*

[130] Press Release: The Empire Tract – the Jewel in the Meadowlands Crown – Saved! Environmental Effort Launched 15 Years Ago Ends in the Greatest Urban Wetlands Preservation Victory in U.S. History . Hackensack Riverkeeper, March 25, 2005. available at http://www.hackensackriverkeeper.org/pr_archive/Empire_Tract_Mar2005.htm.

However, the Meadowlands conservation effort remains highly vulnerable to urban development pressures. A strict conservation model (e.g. designated "no build" parkland) may be a viable strategy for more remote wetlands; urban coastal wetlands efforts should ideally exist within the context of growth and development strategies rather than in opposition to them; the economic pressure of development must be accommodated or it risks forcing the wetland into a Solomonic compromise (being split in half). The contradictory scenarios of pure preservation and pure development is a likely course to ecological failure.

B. Boston Harbor Wetlands National Recreation Area

The islands had served during the nineteenth century as a human sanctuary and a place of personal renewable or escape from an increasingly industrial urban environment.

The Boston Harbor Islands National Recreation Area (NRA) was created in 1996 and is managed by a partnership consisting of multiple federal, state and local government agencies. The NRA consists of over 30 small coastal islands outside of Boston, Massachusetts and proximate to Logan International Airport (2 small islands were destroyed as part of the airport's construction). Approximately 7 million people live within 50 miles of the islands. Individual management of islands is delegated to individual agencies; the partnership has a fundraising arm and functions as a means to unify management policy. The islands constitute over 1600 acres of land and coastal wetlands. Boston Harbor is an estuary (a mix of fresh and salt water) and features extensive development along its edge, which contrasts with the island's roles as a wildlife habitat, marine organism nursery, water filtration and flood control.[131] The islands serve as a physical and social barrier between the open ocean and the densely populated urban Bay. The islands serve as shelter for upland and marine wildlife (with over 100 species of birds), and feature both salt marshes ("the most highly productive ecosystems in the world") and the last remaining patches of seagrass in the urban area.[132] The plan utilizes an approach described as "environmental zoning" in which management areas provide the most appropriate mix of

[131] Boston Support Office of the Northeast Region of the National Park Service. GENERAL MANAGEMENT PLAN: BOSTON HARBOR ISLANDS, A NATIONAL PARK AREA at 1-55 (2002) available at http://www.nps.gov/archive/boha/parkdocs/fgmp/BOHA_gmp.pdf.

[132] *Id.*

uses based upon a balance of ecological character and human needs.[133] Certain resources are given an "overlay" designation throughout the entire park, and override area-specific management strategies.[134] Notably, the plan specifically exempts the airport and its flight pattern from any interpretation in which it would constitute the use of or otherwise impair the park. In balance with the delicate ecology, the NRA offers limited and seasonal visitation and recreational opportunities for certain islands. The NRA serves as a means to preserve and protect the islands by means of facilitating administrative cooperation; disparate entities are unified under a single tent of coordinated policy.

The Boston NRA presents a unique cooperative management model for entities which extend across multiple jurisdictions. The NRA encourages conservation not through the use of a centralized authority with superior jurisdiction, but rather in a cooperative model which establishes standards and best management practices. This "soft" approach to regulatory protection is seemingly weak as it does not provide for an inherently stronger and entirely new administrative structure. However, the NRA serves as a realpolitik example that the urban wetlands conservation strategies may also exist within the existing regulatory landscape.

C. New Orleans & Louisiana's Estuarine Wetlands

The importance of wetlands as a storm surge reduction means was noted in both academic journals and popular media. Louisiana, south of New Orleans, had a vast collection of estuarine and tidal wetlands at the mouth of the Mississippi River. Hurricane Katrina alone, in 2005, destroyed over 100square miles of wetlands.[135] However, coastal wetlands erosion had

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[133] *Id.*

[134] *Id.*

[135] Ryan M. Seidemann, Louisiana Wetlands and Water Law: Recent Jurisprudence and post-Katrina and Rita Imperatives, 51 LOY. L. REV. 861 (2005). *See also* Oliver Houck, *Can We Save New Orleans?* 19 TUL. ENVTL. L.J. 1 (2006). Houck also discusses the impact of energy development (a prime New Orleans industry) upon coastal wetlands. ("The [Oil] industry has excavated billions of gallons of brines, salts and minerals from under the wetlands, much of it close to the surface, following which - surprise! - they caved in. Marsh erosion or subsurface extraction: pick your weapon, they both kill. The sum is daunting. Apart from the major navigation systems across the coastal zone, we have another 8000 miles of canals and pipelines and they are all eroding. They are all speeding salt water into freshwater systems, which are already on life-support and imploding. It's hard to find your fishing spots these days out of Hopedale, Delacroix and Yclosky. After Katrina, it's even hard to find the towns. Every scientific study available places the cumulative impacts of oil and gas activities ahead of even the Mississippi levees as a

been a serious problem for several decades preceding the storm; the coastal wetlands south of New Orleans were being lost at the rate of approximately one acre per week; over 1,000 square miles have been lost as a result of development, levee construction, and oil extraction.[136] Hurricane Katrina caused irreparable damage to New Orleans, forever disrupting its population, culture and infrastructure. However, many of these tragic events and much of the related damage could have been minimized or reduced had more wetlands been present to absorb and reduce the storm surge.[137] With a weakened wetland barrier, Hurricane Katrina's coastal flooding raced inland, largely unimpeded. Much attention has already been provided to the issue of hazard mitigation, and the ultimate causes of tragedy and damage are ultimately far more complex then suggested in this brief excerpt. However, it is important to note that, although the issue of wetland loss in coastal Louisiana had long been recognized as a serious problem by both scientists and environmental planners, the potential economic benefits of wetlands as a hazard mitigation measure did not seriously enter the political decision framework until it was too late.

D. San Francisco Bay Area / South Bay Tidal Wetlands

The vast San Francisco Bay is perhaps the most identifiable geographic symbol of the region; the Bay's geography has long dictated settlement patterns. One newspaper editorial declared that "the Bay is central to our quality of life and our very identity as a region. It shapes our geography and our weather. It is the heart of our economy and our tourism." However, more than a century of urban fill projects and diking destroyed

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leading cause of land loss in Louisiana, with responsibility above 50% overall, and up to 90% in heavily exploited fields. And here is the mystery: nobody talks about it. It's like this big secret. Daddy's got a drinking problem. We walk quietly around him. After all, Daddy is very big. And he is also paying the bills. It's a matter of attitude. Years ago I represented the Florida Wildlife Federation, which had problems with some oil drilling permits near the Everglades. Exxon rushed its A team up from Houston to persuade us that there would be no environmental problems. We're doing everything by the book, they assured us, board access roads, run-off controls, waste disposal. Seeing a little skepticism remaining, they took their best shot: "This is in Florida," they told us, "and they have strict regulations over there. They're not ... Louisiana!" Louisiana could have required that the canals be backfilled after their time was up, but industry resisted and so we never did. Louisiana could have required them to spray dredged material over the marsh, rather than piling it on spoil banks, but industry resisted and so we didn't do that either. Louisiana could have required that the industry access its sites by over-marsh vehicles, which have been available for decades. No such requirement was even proposed. We could have had our oil and our marshes too." *Id* at 18-19).

[136] *Id.*

[137] *Id.*

95% of the original fertile tidal wetlands, which served as an important link in the Bay's ecology and food chain. By the 1960s, public pressure caused the creation of a new state authority to regulate wetland development, and many urban fill proposals were abandoned. Recent efforts have included dozens of small-scale projects in the region to restore wetland habitat.

Historically, the vast wetlands of the South San Francisco Bay Area, including wetlands near San Jose, have been used for salt harvesting; salt extraction dates through the colonial era in the early 19th century, and to the precontact era. Salt was used as part of a mineral processing action, and by 1868 there were 18 salt companies operating on the South Bay. As naturally evaporated areas were depleted, salt companies began to dig ditches and artificial ponds in the late 19th century. The South Bay also became home to a military base and research facility, Moffet Field, which opened in 1931. Later listed by the EPA as a Superfund priority site, Moffet Field operations released PCBs, DDT, lead, zinc, petroleum hydrocarbons, as well as volatile and semi- volatile organic compounds into the nearby marshland. A long-anticipated cleanup of the site, planned by the EPA and the Navy, is underway.[138]

One current restoration initiative, the South Bay Restoration Project, is the largest such project on the West Coast, and aims to convert over 15,000 acres of commercial salt ponds back into original coastal urban wetlands. Between 80 and 90 percent of the original wetland in the South Bay (San Jose – San Francisco area) was lost to development. A particularly illustrative example of development was the historic conversion of wetlands to commercial "salt pond" extractive uses. Salt was isolated and harvested through dikiing and impounding of Bay waters. In 2003, the present owner, Cargill, sold the salt ponds (approximately 9,600 acres) to the US Fish and Wildlife Service, while the California Department of Fish and Game acquired an additional 5,500 acres of salt ponds.[139] The salt extraction industry lost economic value, and, as the area's economy and geography transitioned to residential communities, there was considerable pressure to replace an industrial eyesore with a healthy and aesthetically-pleasing ecosystem.

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[138] *The Wetlands of South San Francisco Bay: Past, Present & Future* (2002) available at http://geo.arc.nasa.gov/sge/wetlands/Moffett_Wetlands_final.pdf

[139] *See generally* South Bay Salt Pond Project, available at http://www.southbayrestoration.org/

The South Bay is also host to San Francisco International Airport, a busy airport which sits on the edge of the Bay upon eight square miles of filled former wetlands. A recent proposal, now on hiatus, by the airport proposed expanding runways by filling approximately two square miles of the Bay. An external audit by the San Francisco Board of Supervisors and the City Budget analyst found that, according to project opponents, "SFO tried to sell the runways instead of studying alternatives, ignored public input, skirted contracting regulations and let consultants gorge themselves at the trough."[140] Public outcry led to an amendment to the City charter which would have forced a referendum on projects which would fill more than 100 Bay acres. This amendment was also supported by the city Chamber of Commerce, as well as the Airport Commission, as a means to introduce democracy into difficult environmental decisions.

Although the airport project is in hiatus, it is an important demonstration of the usefulness of direct political engagement over wetlands issues; raised consciousness reveals that wetlands may be taken seriously in urban areas. Restoration projects in both the South Bay and at Moffet Field demonstrate how enforcement of existing laws may help to spur restoration, but that economic pressure may also spur restoration, independent of environmental laws.

COMMON CHALLENGES FACING URBAN COASTAL WETLANDS

Urban coastal wetlands face critical challenges in balancing ecological protection with inevitable population growth. While some of the most serious physical abuses to wetlands, including fill and dredging, have been often corrected by an arsenal of environmental laws, additional regulatory strategies are needed to stem the increasing rates of loss or degradation. The attention of environmentalists has typically been turned towards areas which are the most remote and pristine; urban coastal wetlands as a research topic has received relatively little academic attention. Yet their value as a means of maintaining balanced urban ecology is critical and their diverse benefits increasingly recognized. However, this general awareness needs to be integrated into legal and land use frameworks; the role of wetlands as a security function in reducing hazard-related damage is still not a priority within the larger framework of urban planning. Unlike a distant forest

[140] *See* Save The Bay: SFO available at http://www.savesfbay.org/site/pp.asp?c=dgKLLSOwEnH&b=488935.

easily placed under the domain of a single agency, urban coastal wetlands must develop creative administrative strategies to advance management and conservation strategies. By the mere nature of urban density, coastal wetlands regulatory protection must balance multiple interests into a single framework. Given that nearby populations have a heavy ecological footprint, but that such populations will continue to grow, it is unlikely that coastal wetland s will prevail in a pure conservation battle to limit or reduce upland watershed growth. Rather than being thought of as inapposite to their urban populations, supporters of urban coastal wetlands need to identify mechanisms which encourage an "urban ecology" in which population growth is directed in a manner which lessens negative impacts; with the right tools, population growth may be considered a savior, rather than a threat, to urban coastal wetlands.

REGULATORY REFORMS NEEDED TO ENSURE EFFECTIVE URBAN WETLANDS PROTECTION

Urban coastal wetlands face complex challenges in developing effective regulatory strategies. The poor results indicate that existing regulatory strategies are ineffective; they provide for limited protection by only tackling specific issues, and often fail to link federal environmental goals and land-use activity. An appropriate strategy for urban coastal wetlands must reflect the need for next-generation environmental regulatory strategies which are "tailored to local contexts," "cooperative, not confrontational," and "comprehensive, not fragmented."[141] This new approach to environmental decision-making needs to engage a wide variety of interests, and, most importantly, link together the system of state and federal rulemaking with the teeth of local land-use policies.[142] In the recent past, "environmental policy-makers have proceeded as if these two realms were entirely disconnected."[143] The watershed approach demands a comprehensive approach; piecemeal strategies (for example, pursuing structural restoration without water quality improvements) run the risk of producing counterproductive or diminished results. This new philosophical approach to environmental law offers a promise to move forward some specific initiatives for urban coastal wetlands, including:

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[141] Nolon, supra note 48 at 411. *see also* Robert R.M. Verchick, *Can Local Government Save the Global Commons? Lessons from the Johannesburg Summit* 4 STAN. AGORA 4 (2003)

[142] *Id*.

[143] *Id*.

- Maintstreaming key watershed issues into land use mechanisms. In addition to the continual (and improved) enforcement of existing duties under the CWA, ecosystem health would benefit from the effective control of non-point source pollution in a broadly-defined watershed. Local land use mechanisms do not always address critical environmental goals, while the structure of traditional environmental laws rarely allows for substantive changes to land use patterns or designs. A wide variety of land use tools may help control the density and geographic concentration of watershed settlement, in addition to helping to minimize pollution through the mandate of better initial design.

- Creation of a centralized management strategy which also permits some degree of autonomy among different existing jurisdictional interests. This wetlands management strategy should promote the use of uniform standards or best practices within a watershed, and encourage the formation of interagency working groups. This model is markedly different than the creation of a new central authority over a city's wetlands area; rather than pursuing a "one size fits all" unitary strategy (and accumulating the political capital needed to implement it), it is likely to be more effective if a single entity works to harmonize existing jurisdictional stakeholders while also allowing for the contribution or input from those agencies.

- Adaptive management strategies should be integrated; the scientific issues surrounding urban coastal wetland loss are often complex and interlinked. Climate change in particular poses a considerable scientific challenge by means of understanding the extent to which "micro" changes may have larger impacts. However, scientific uncertainty or imprecision should be no excuse to delay protection measures; adaptive management creates regulatory strategies which can respond, in real time, to new scientific developments. This method prevents "stale" outdated laws which linger long after more effective means or alternatives have been identified.

- "Branding" in regulatory preambles and legislative histories. Studies have noted the importance of "branding" wetlands as a viable social issue, as evidenced by "save the Bay" public campaigns and logos. Such outreach efforts need to not stop at print advertising, but needs to be encouraged as a functional preamble or amendment to existing or proposed regulatory or statutory initiatives, as well as a public recognition by relevant administrative

bodies. Judicial review of future controversies under those regulations or administrative actions will likely be more willing to acknowledge the importance of wetlands if it has an independent precedent upon which to base this judgment.

- Climate change adaptation measures – sea level rise, ocean acidification and other potential impacts of climate change are still being studied and analyzed. Preliminary studies indicate that climate change impacts may act as a catalyst in accelerating wetlands depletion. Inland migration of wetlands presents a complex challenge given existing development; one potential measure would be to ensure that voluntary acquisition of property (or potentially even condemnation) could be undertaken as a means to ensure wetlands relocation.

CONCLUSION

Coastal wetlands are an under-recognized urban asset which form the backbone of a unique and critical ecological system every bit as important an infrastructure component as subways, schools and parks. Such wetlands are not only an important habitat, but have an important role in improving water quality, reducing storm damage, and serving as the gateway to natural resource education or enjoyment for dense populations with limited opportunities to experience the natural world. However, modern industrialization and urbanization has taken a heavy toll on these fragile resources; our urban coastal wetlands are literally slipping away before our eyes. This situation has not gone unnoticed by planners and legislators; a whole generation of water quality laws and related planning activity has taken place; however, these strategies have more recently had a limited impact in conserving urban coastal wetlands. This diminishing rate of return may be chalked up to the reliance upon top-heavy federal strategies which are unable, by either design or law, able to address the non-point source pollution impacts scattered across thousands of individual residences or businesses within a dense and expansive watershed. Even regulatory strategies which provide a seat at the table for local governments fail to provide a link between environmental goals and local activities which have the greatest impact on wetlands. It is clear that the next generation of urban coastal wetland regulatory protections must be rooted deeply within local governments, whose policies and choices have the greatest potential to save wetlands. Land use strategies for urban coastal wetlands must encompass a wide variety of watershed activity, and have a high potential to make an

immediate impact by both embracing comprehensive strategies and dictating the terms of urban growth.

The further development of large cities is not only a rising global phenomenon, but also a necessary environmental goal; without clustered urban growth, our world will only sprawl outward across vast distances and devour green space. However, urban populations have an unmistakably negative footprint felt perhaps strongest upon their own coastal wetlands. Effective wetlands regulatory strategies must realize that such urban growth – and the localized tools which keep it growing – is not necessarily incompatible with wetlands conservation; indeed, by tethering regulatory protection strategies to future growth, towering skyscrapers may bolster tall reeds.

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