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No Net Loss? The Past, Present, and Future of Wetlands Mitigation Banking

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NO NET LOSS? THE PAST, PRESENT, AND FUTURE OF WETLANDS MITIGATION BANKING

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CONTENTS

INTRODUCTION

The U.S. Supreme Court proclaimed just over a century ago that "[i]f there is any fact which may be supposed to be known by everybody, and, therefore by courts, it is that swamps and stagnant waters are the cause of malarial and malignant fevers, and that the police power is never more legitimately exercised than in removing such nuisances."[1] This dismal portrayal of what we today call wetlands reflected the view of many federal and state courts, which supported an unfettered property right to drain and fill wetlands at will.[2] Yet, a century later, a Rhode Island court declared that filling a wetland area to make room for residential development would constitute a "predictable

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1. Leovy v. United States, 177 U.S. 621, 636 (1900).

2. *See* John Copeland Nagle, *From Swamp Drainage to Wetlands Regulation to Ecological Nuisances to Environmental Ethics*, 58 CASE W. RSRV. L. REV. 787, 790–92 (2008).

(anticipatory) nuisance" and thus was subject to regulatory prohibition.[3] The Supreme Court had changed its mind even earlier, upholding federal restrictions on filling wetlands.[4] Suffice it to say that no court today would endorse the judicial practices of the past when it comes to wetlands.

What explains the about-face in judicial perception of wetlands from "they are nuisances that must be removed" to "removing them causes a nuisance"? As Justice Scalia once famously observed, the doctrine of nuisance and other background principles of property law evolve over time based on "changed circumstances or new knowledge."[5] The wetlands story is just such a case study. New knowledge from wetlands science increasingly revealed the ecological importance of wetlands, as well as their economic importance in delivering benefits to humans.[6] The Rhode Island court, for example, observed that the wetland in question "filters and cleans runoff,"[7] and in upholding the federal wetland regulations the Supreme Court explained that wetlands "play a key role in protecting and enhancing water quality."[8]

The courts of the past and in modern times were following the lead of legislatures both in condemning wetlands and in making the turn in wetlands policy based on the revelations from wetlands science. In the eighteenth century, for example, the Swamp Act of 1849[9] transferred to Louisiana "the whole of those swamp and overflowed lands, which may be found unfit for cultivation."[10] Draining of wetlands to open up agricultural development continued for many decades, but concern over declining waterfowl populations led to a legislative initiative to protect wetlands through statutes such as the Migratory Bird Treaty Act.[11] The tide continued to shift in favor of wetlands conservation, and today it

3. Palazzolo v. State, No. WM 88-0297, 2005 WL 1645974, at *5 (R.I. Super. Ct. July 5, 2005).

4. United States v. Riverside Bayview Homes, Inc., 474 U.S. 121, 139 (1985).

5. Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1031 (1992) (regarding nuisance doctrine). For numerous doctrinal examples, see Michael C. Blumm & J.B. Ruhl, *Background Principles, Takings, and Libertarian Property: A Reply to Professor Huffman*, 37 ECOLOGY L.Q. 805 (2010).

6. Katherine C. Ewel, *Water Quality Improvement by Wetlands*, *in* NATURE'S SERVS. 329, 329–31 (Gretchen C. Daily ed., 1997).

7. *Palazzolo*, 2005 WL 1645974, at *5.

8. *Riverside Bayview Homes*, 474 U.S. at 133.

9. Ch. 87, § 1, 9 Stat. 352.

10. *Id.*; *see* Nagle, *supra* note 2, at 792.

11. Ch. 128, 40 Stat. 755 (1918) (codified as amended at 16 U.S.C. §§ 703–711). For a thorough history, see Douglas R. Williams & Kim Diana Connolly, *Federal Wetlands Regulation: An Overview*, *in* WETLANDS LAW AND POLICY: UNDERSTANDING SECTION 404 at 1, 3–4 (Kim Diana Connolly et al. eds., 2005); see also Blumm & Ruhl, *supra* note 5, at 829.

would be unthinkable that Congress or a state legislature would enact legislation designed to systematically destroy wetlands. Instead, a multitude of federal and state statutory regimes protect and conserve wetlands by restricting the kind of land development that led to litigation disputes in which courts, like those mentioned above, have embraced wetlands conservation.[12]

In this Article we examine the last fifty years of that history through the lens of the workhorse of federal wetlands protection legislation, section 404 of the Clean Water Act,[13] and the benefits wetlands provide to human communities in the form of what is now referred to in environmental science and policy as "ecosystem services."[14] Part I traces the origins and early history of section 404, showing that Congress had primarily water quality, not wetlands conservation, in mind for the purposes of the statutory program. Only after the statute was enacted and its two implementing agencies, the U.S. Army Corps of Engineers ("Corps") and Environmental Protection Agency (EPA), began their administration did wetlands conservation creep into the scope of section 404, eventually becoming its sine qua non. Part I focuses in particular on the emergence in the late 1980s of the federal policy of "no net loss" of wetlands and the concept of "compensatory mitigation" as the release valve that, in theory, would allow land development to proceed while not violating the no net loss goal.

Part II explains how growing discontent with early compensatory mitigation practices, which generally relied on small, one-off wetland preservation or enhancement projects to offset losses at development sites, led in the 1990s to the Corps' adoption of "wetlands mitigation banking," which uses large wetland restoration projects to serve as centralized sources of compensatory mitigation for development projects. Portrayed by both the Corps and EPA as ecologically superior to the "postage stamp" mitigation siting approach, banking became the dominant and preferred form of compensatory mitigation.

Notwithstanding wetland mitigation banking's prominent policy status, Part III surveys the mounting scientific and policy research, including ours, questioning the implementation of banking and, in particular, its effect on the distribution of wetland ecosystem services. Responding to a congressional directive to pull together the compensatory mitigation program into a coherent regulatory regime,

12. For an overview, see *Wetlands Programs Adopted by States and Tribes and Analysis of Core Components*, U.S. EPA, https://www.epa.gov/wetlands/wetlands-programs-adopted-states-and-tribes-and-analysis-core-components [https://perma.cc/N55G-PUPN] (May 12, 2022).

13. 33 U.S.C. § 1344 (2020).

14. Daily, *supra* note 6; James Salzman & J.B. Ruhl, *The Law and Policy Beginnings of Ecosystem Services*, 22 J. LAND USE & ENV'T L. 157, 157 (2007).

the Corps and EPA promulgated a rule in 2008 ("2008 Rule" or "2008 Mitigation Rule") that included a provision recognizing the importance of ecosystem services and committed the Corps to assessing impacts to their distribution. We wrote soon after with great hope that this provision would lead to robust ecosystem services impact assessments as standard Corps practice when making compensatory mitigation decisions.[15]

Part IV gets to the primary contribution of this Article—describing and evaluating how the Corps and EPA have followed through on the ecosystem services component of the 2008 Rule. Given recent scientific research emphasizing the importance of urban wetland services, we argue that urban communities should be able to easily access Corps decision documents providing ecosystem services impact assessments. We conclude, however, that the Corps has lagged behind other federal agencies in developing policies to guide how ecosystem services factor into regulatory decisions, and that access to Corps decision documents is overly and unnecessarily cumbersome and complicated.

In Part V we step back to assess the importance of urban ecosystem services and the ability of communities to evaluate how Corps and other regulators are managing their "balance sheet." We argue that community access to such information is vital to fulfilling goals of environmental justice, particularly given the looming threat climate change poses to urban ecosystem services.

I. HISTORY OF SECTION 404 AND NO NET LOSS

The law popularly known as the Clean Water Act (CWA or the Act) is actually a set of 1972 amendments to the Federal Water Pollution Control Act,[16] a law originally passed in 1948 with a focus on funding municipal water treatment works.[17] The CWA transformed what had primarily been a funding mechanism for infrastructure into a pollution-focused regulatory mandate. Most of the CWA's legislative history focused on the permit requirements for pollution. Section 311 of the CWA broadly prohibits the discharge of any pollutant by any person into navigable waters.[18] The origins of mitigation banking lie in a different section of the Act later known as section 404.[19] Despite its

15. J.B. Ruhl, James Salzman & Iris Goodman, *Implementing the New Ecosystem Services Mandate of the Section 404 Compensatory Mitigation Program—A Catalyst for Advancing Science and Policy*, 38 STETSON L. REV. 251, 271–72 (2009).

16. Ch. 758, 62 Stat. 1155 (1948).

17. *Id.*

18. 33 U.S.C. § 1321(b)(1).

19. *Id.* § 1344.

potential impact, that provision received remarkably little attention during congressional hearings.

Section 404 regulates the discharge of dredged or fill material into navigable waters. It authorizes the Secretary of the Army, through the Corps, to "issue permits, after notice and opportunity for public hearings for the discharge of dredged or fill material into navigable waters at specified disposal sites."[20] These permits are known as "404 permits," "wetland permits," or "Corps permits" and form the cornerstone of federal efforts to encourage protection of wetland resources through market-based means. But the focus of section 404 didn't start out that way. Reading the legislative history of the CWA reveals two important issues, one obvious and one unstated.

The obvious debate turned on who should run the permitting program—the Corps or the recently created EPA. The Corps' claim rested on the fact that it already administered a water resource permitting program under the Rivers and Harbors Act of 1899[21] and had only a few years before added robust environmental impact review and protection standards to the program.[22] As James J. Reynolds, President of the American Institute of Merchant Shipping, testified:

> [U]nder existing regulations, the disposal of dredge spoil, resulting from the deepening of our Nation's channels, is controlled by the Chief of the Corps of Engineers under authority delegated to him by the Secretary of the Army. This authority has been in existence since it was first so delegated 83 years ago by the act of June 29, 1888.
>
> Following the enactment of the Fish and Wildlife Coordination Act of 1956, the Corps has included in its careful consideration of disposal sites the impact of its decisions on fish and wildlife. They also presently include within their consideration matters of water quality, conservation, esthetics, ecology, all the important environmental factors.[23]

Thus, early proposals for the CWA contained provisions that would allow the Corps to govern federal dredge and fill projects by regulations rather than permits, not subject to any EPA review of specific projects.

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20. *Id.* § 1344(a).

21. *Id.* § 403.

22. *See* Williams & Connolly, *supra* note 11, at 4–5. For a thorough history of the Corps' expansion of Rivers and Harbors Act regulation, see Jeffrey K. Stine, *Regulating Wetlands in the 1970s: U.S. Army Corps of Engineers and the Environmental Organizations*, 27 J. FOREST HIST. 60 (1983).

23. *Water Pollution Control Legislation—1971 (Proposed Amendments to Existing Legislation): Hearing on H.R. 11896 Before the H. Comm. on Pub. Works,* 92nd Cong. 1855 (1971) (statement of James J. Reynolds, President, American Institute of Merchant Shipping).

The proposal by Senator Allen Ellender of Louisiana, for example, would have required only "cooperation" with the EPA Administrator.[24]

Senator Edmund Muskie from Maine, the main force behind the CWA in the Senate, held out for a more central EPA role. While agreeing that the Corps should retain decision-making authority over dredging and filling, Muskie's proposed amendment required joint administration by both the Corps and EPA. During the hearings he argued that

> conversely, spoil disposal should be subject to EPA regulations. Spoil disposal is a pollutant. Any person who wished to dump polluted dredge spoil into navigable waters would be required, under this section, to get a permit from EPA or the State, just as would be required of other discharges.
>
> . . . .
>
> The Corps of Engineers, a mission-oriented agency, is not equipped to evaluate the environmental impact of these dredging activities. It is equipped to form judgments on what is needed for navigation. This bill does not take that judgment-making authority from it. The amendment would shift the environmental evaluation authority from EPA to the Corps of Engineers, and the committee is against it.[25]

The second noteworthy aspect of section 404's legislative history is what was *not* discussed. Given the furor that section 404's regulation of wetlands would later create, it is striking that there was little mention in the legislative history of conserving wetlands. That, after all, has been the focus of development and property rights ire for decades. Yet no dispute over wetlands was evident at the time. The testimony focused on the pollution problems caused by the discharge of dredge and fill into navigable waters.[26]

In particular, it was not obvious that dredge and fill activities would be regulated under other parts of the CWA. After all, what would the

24. 117 Cong. Rec. 38,854 (1971) (statement of Sen. Allen Ellender).

25. *Id.* (statement of Sen. Edmund Muskie); *Water Pollution Control Legislation—1971 (Proposed Amendments to Existing Legislation): Hearing on H.R. 11896 Before the H. Comm. on Pub. Works*, 92nd Cong. (1971) 274 (statement of Kerry Mulligan, Chairman, Cal. State Water Res. Control Bd.) ("[T]hese standards should be adopted under the EPA, not the U.S. Corps of Engineers, who have no expertise in the field of water quality. They (the Corps) have tremendous expertise in many areas, but in water quality they are neophytes.").

26. *See Water Pollution Control Legislation—1971 (Proposed Amendments to Existing Legislation): Hearing on H.R. 11896 Before the H. Comm. on Pub. Works,* 92nd Cong. (1971).

point source be for dredging and filling? As Louise C. Dunlap testified for Friends of the Earth:

> [I]t seems highly inconsistent with the water quality goals and deadlines stated throughout the other sections of the bill to allow the discharge by permit of any solid materials into navigable waters in the form of dredged and fill material. It seems quite inequitable that industrial point-source polluters would be required to aim for zero or near-zero discharge of effluents, under the permit system, while the Corps of Engineers is allowed to operate a separate and independent permit system allowing discharge of dredge and fill directly into navigable waters.[27]

The final agreed-upon amendment gave the Corps regulatory authority but provided for the EPA Administrator, following consultation with Corps, to deny a permit "whenever he determines, after notice and opportunity for public hearings, that the discharge of such materials into such area will have an unacceptable and adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas."[28] Note that this indirectly protects wetlands but almost entirely for economic reasons. The conservation of ecosystem services is entirely absent from the legislative history and statutory text.

Given this background, it is no surprise that mitigation of dredge and fill impacts was discussed neither at the time of the CWA's passage nor in 1975, when the Corps promulgated regulations for issuance of 404 permits. Indeed, to the dismay of environmental organizations, the Corps regulations limited the scope of section 404 permitting to the same scope applied under the Rivers and Harbors Act—navigable waters below the mean high water mark—which excluded most coastal and freshwater wetlands.[29] That soon changed, as litigation by environmental groups ultimately led to court decisions finding that the CWA reached more expansively.[30] The Corps reluctantly added wetlands to its permitting inventory, and the EPA revised its regulations in what become known as the "Section 404(b)(1) Guidelines" ("Guidelines"), setting out the mitigation sequence for 404 permits. In granting 404 permits, the Guidelines call for a "sequenc[ing]" approach, which essentially lists wetland protection actions in the following order of desirability: (1) avoid filling wetland

27. *Water Pollution Control Legislation—1971: Hearings on H.R. 11896 and H.R. 11895 Before the H. Comm. on Pub. Works*, 92nd Cong. 422 (1972) (statement of Louise C. Dunlap, Assistant Legis. Dir., Friends of the Earth).

28. 33 U.S.C. § 1344(c).

29. *Compare id.*, *with id.* § 403.

30. Stine, *supra* note 22, at 65–66; *see also* Nat. Res. Def. Council, Inc. v. Callaway, 392 F. Supp. 685, 685 (D.D.C. 1975).

resources, (2) minimize adverse impacts to those wetlands that cannot reasonably be avoided, and (3) provide compensatory mitigation for those unavoidable adverse impacts that remain after all minimization measures have been exercised.[31]

Even with the Guidelines in place, however, the Corps was reticent to require mitigation during the Reagan years of the 1980s. Regulatory relief was the watchword of the time, not measures to slow or increase the cost of development. But this all changed on the campaign trail of Vice President George H.W. Bush in 1988. Running against Massachusetts Governor Mike Dukakis, Bush made environmental protection a central platform of his presidential campaign. He embarrassed Dukakis by holding a press conference in front of the heavily polluted Boston Harbor. He went a step farther at a speech to the conservation hunting group Ducks Unlimited, where he proclaimed that there would be "no net loss of wetlands."[32] Once Candidate Bush became President Bush, the EPA and Corps faced a seemingly insoluble challenge: how could the government permit development that fills wetlands while also ensuring the new policy of "no net loss" of wetlands?

As described above, in granting 404 permits, the Guidelines called for a "sequencing" approach that required a developer to convince the Corps that no reasonable alternatives exist to the development of the wetlands, that the design of the development minimizes harm to the wetlands, and, if these two conditions were satisfied, that other wetlands have been restored to compensate for the wetlands destroyed. This last requirement, known as "compensatory mitigation," would allow both development and restoration, but its scope was limited.[33] The EPA and the Corps preferred on-site to off-site locations for compensatory mitigation activities.[34] As an example, if a mall were built on a salt marsh, on-site mitigation would require restoring a wetland on that or an immediately adjacent parcel. This freed some highly valued wetlands for development but also presented costly design constraints. On-site mitigation thus faced criticism from developers, who started exerting significant political pressure in the 1980s to loosen

31. Memorandums of Agreement (MOA); Clean Water Act Section 404(b)(1) Guidelines; Correction, 55 Fed. Reg. 9210, 9210–12 (Env't Prot. Agency & Dep't of Army, Mar. 12, 1990).

32. George Bush, Remarks to Members of Ducks Unlimited (June 8, 1989), AM. PRESIDENCY PROJECT, https://www.presidency.ucsb.edu/documents/remarks-members-ducks-unlimited [https://perma.cc/KC59-2GC3] (last visited Feb. 12, 2023).

33. *See supra* note 31.

34. *See* Royal C. Gardner, *Mitigation*, in WETLANDS LAW AND POLICY: UNDERSTANDING SECTION 404, *supra* note 11, at 253, 259 [hereinafter Gardner, *Mitigation*].

up or even gut the 404 permitting process.[35] One strategy was to limit what counted as a wetland.[36] But calls for reform of the 404 program came from environmentalists as well, who decried the practical experience of on-site mitigation projects.[37]

Indeed, while attractive in theory and providing some political shelter, the project-by-project compensatory mitigation approach soon became widely regarded as having failed miserably in terms of environmental protection. Whether on-site or near-site, the piecemeal approach complicated the Corps' ability to articulate mitigation performance standards, monitor success, and enforce conditions. Many developers went through the motions of so-called "landscape mitigation"—planting what was required or regrading where required to meet the minimum letter of the permit—then moved on, leaving the

35. Robert W. Stewart, *Land Developers Leery of Wetland Protection Pact*, L.A. TIMES (May 14, 1990, 12:00 AM), https://www.latimes.com/archives/la-xpm-1990-05-14-mn-181-story.html [https://perma.cc/4BUE-US7G] (As the environmental director of one company said, "Their standards for avoidance may be so great that we'd never be able to demonstrate that it's impractical to avoid (filling) a wetland anywhere"); Jonathan Tolman, *Attack of the Wetland Enforcers*, WALL STREET J., July 18, 1994, at A12 ("[T]housands of developers, homebuilders, and property owners across the country are wasting millions of dollars hiring experts, filling out permit applications, and paying loans and taxes while they wait for the corps to reach a decision.").

36. The Bush White House had sought to ease the restrictions of 404 permits by redefining what counted as wetlands. It is easier to meet no net loss if few areas count as wetlands.

> But a new manual on wetlands, issued in January 1989 as Bush entered office, angered development interests—oil drillers, timber companies, farmers and real estate investors—that contributed heavily to his campaign. They demanded revisions in the definition of wetlands, saying it was so broad that it prevented them from building on land that was only rarely wet.
>
> The manual revisions were handled by the President's Council on Competitiveness, headed by Vice President Quayle. Over the objections of federal environment officials, the council crafted a plan to remove wetlands status from areas that are soaked at the surface for less than 21 consecutive days.

Michael Weisskopf, *Wetlands Policy Shift Announced; Bush Endorses Plan Easing Protection for Millions of Acres*, WASH. POST, Aug. 10, 1991, at A1.

37. *See, e.g.*, Michael J. Bean & Lynn E. Dwyer, *Mitigation Banking as an Endangered Species Conservation Tool*, 30 ENV'T L. REP. 10537, 10538–39 (2000) ("The track record of traditional, project-by-project wetland mitigation is dismal.").

"restored wetland" to revert back to its original habitat, usually a wetland in name only, if even that.[38]

Moreover, for reasons that are still not entirely clear, there was remarkably little compliance monitoring of the mitigated sites by the EPA, the Corps, or relevant state agencies. Without the threat of being found out, a wetlands restoration expert bluntly noted, it was "easier and cheaper to hire, say, a landscaper who will design and build something that looks green and wet . . . than hire a restoration expert."[39] The net result of this institutional failure, as wetlands expert Royal Gardner observed, was that "[t]he failure of compensatory mitigation is wetland regulation's dirty little secret."[40]

II. The Rise of Mitigation Banking

In light of these problems, the Corps and EPA (supported by many commentators) took a close look at the practice of state highway departments. Not surprisingly, state highway departments build a lot of roads through wetlands. That means a lot of dredged and a lot of filled wetlands. Rather than construct new wetlands on-site, the departments had started building "wetlands mitigation banks." The highway departments realized they could more cheaply create large sites of wetlands on cheap land that could then provide credits as needed to compensate for destroyed wetlands.[41]

Shifting compensatory activities from on-site to off-site mitigation, its proponents argued, would prove advantageous both in terms of efficiency and ecological benefits, aggregating small wetlands threatened by adjacent development into larger restored wetlands in a different location.[42] Indeed, when contrasted with the experience of on-site compensatory mitigation, the arguments presented for wetlands mitigation banking seemed compelling:

- It may be more advantageous for maintaining the integrity of the aquatic ecosystem to consolidate compensatory mitigation into a single large parcel of contiguous parcels when ecologically appropriate.

38. Lawrence R. Liebesman & David M. Plott, *The Emergence of Private Wetlands Mitigation Banking*, Nat. Res. & Env't, Summer 1998, at 341, 344 (discussing a Florida state agency study finding a 27 percent success rate of such projects).

39. Keith Bowers, *What Is Wetlands Mitigation?*, Land Dev., Winter 1993, at 28, 33.

40. Royal C. Gardner, *Banking on Entrepreneurs: Wetlands, Mitigation Banking, and Takings*, 81 Iowa L. Rev. 527, 540 (1996).

41. *See* Institute for Water Resources, U.S. Army Corps of Engineers, IWR Rep. 92-WMB-1, Wetlands Mitigation Banking Concepts 2 (1992).

42. *See* Gardner, *Mitigation*, *supra* note 34, at 267–68.

- Establishment of a mitigation bank can bring together financial resources, planning, and scientific expertise not practicable to many project-specific compensatory mitigation proposals.
- Use of mitigation banks may reduce the time spent on permit processing and provide more cost-effective compensatory mitigation opportunities for projects that qualify.
- Compensatory mitigation is typically implemented and functioning in advance of project impacts, thereby reducing temporal losses of aquatic functions and uncertainty over whether the mitigation will be successful in offsetting project impacts.
- Consolidation of compensatory mitigation within a mitigation bank increases the efficiency of limited agency resources in the review and compliance monitoring of mitigation projects.[43]

The changing political climate also favored more aggressive mitigation. The deregulatory tsunami represented by Newt Gingrich's Contract with America and election of the 105th Congress in 1994 had put wetlands and endangered species regulation clearly in the crosshairs.[44] Wetlands mitigation banking and Habitat Conservation Plans under the Endangered Species Act[45] served as useful political pressure valves. They each allowed more comprehensive and flexible development to take place in exchange for habitat restoration elsewhere. Compensatory mitigation thus took some of the "sting" out of 404 permits and reduced the frequency of incidents when 404 permitting could be portrayed as unreasonably obstructive.

By the early 2000s, several hundred entrepreneurial banks operated in the nation, selling credits within defined "service area" boundaries to private and public land developers who need to satisfy regulatory wetland mitigation requirements.[46] To give a sense of the practice of mitigation banking, consider the town of Libertyville, Illinois. A wetlands banker converted eighty acres of former cornfields into a wetland bank for $1.2 million. For every acre sold to developers as a

43. *See id.* (summarizing these argued benefits). The EPA and the Corps described these proposed benefits in more detail in their joint guidance. *See* Federal Guidance for the Establishment, Use and Operation of Mitigation Banks, 60 Fed. Reg. 58,605 (Nov. 28, 1995).

44. Robert Hennelly, *Battle over Wetlands Exposes a G.O.P. Faultline,* N.Y. TIMES (May 28, 1995), https://www.nytimes.com/1995/05/28/nyregion/battle-over-wetlands-exposes-a-gop-fault-line.html [https://perma.cc/2BYE-A7YN].

45. Pub. L. No. 93-205, 87 Stat. 884 (codified as amended at 16 U.S.C. §§ 1531–1544).

46. *See* Gardner, *Mitigation*, *supra* note 34, at 266–71.

mitigation credit, developers paid about $65,000.[47] Nationally, the cost of credits per acre ran from as low as $7,500 in rural areas to $100,000 in urban or suburban regions.[48]

The practice continued to grow. While inexact, a 2015 study by a consulting group examined market data to "estimate both the annual transaction value as well as the overall size of the U.S. wetland mitigation credit asset base." They found that "roughly $1 billion in mitigation credit sales was occurring each year in the U.S."[49] Nearly 1.1 million wetland mitigation credits were available for sale as of August 2018, with a potential market value of $74 billion.[50] Mitigation banking has indeed become big business.

III. Critiques of Mitigation Banking

It is important to acknowledge that the Corps has always recognized that wetland and stream ecosystems provide important benefits to human communities. As part of its permit application review process, the Corps conducts a "public interest" review encompassing a broad array of factors, many of which are representative of wetland ecosystem services:

> The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral

47. Madhu Krishnamurthy, *Wetlands Restoration Pays off for Libertyville*, Chi. Daily Herald, Aug. 14, 2001.

48. James Salzman & J.B. Ruhl, *"No Net Loss": Instrument Choice in Wetlands Protection*, *in* Moving to Markets in Environmental Regulation: Lessons from Twenty Years of Experience 329 (Jody Freeman & Charles D. Kolstad eds., 2006).

49. William Coleman, *U.S. Wetland Mitigation Credit Asset Value: New Data Supports Regional Comparisons*, Eco-Assets Sols. & Innovations (Aug. 2018), https://www.researchgate.net/publication/335869895_US_Wetland_Mitigation_Credit_Asset_Value_New_Data_Supports_Regional_Comparisons [https://perma.cc/8S96-8QJT].

50. *Id.*

> needs, considerations of property ownership and, in general, the needs and welfare of the people.[51]

This review, however, is focused on the impacts at the *development* site. When compensatory mitigation is conducted on-site, the review can account for the offsetting benefits provided on-site. As mitigation moved increasingly toward the banking model, however, environmental groups and academics began to raise concerns regarding how effectively the Corps could conduct a holistic public interest review given the regulatory dynamics and, importantly, the distance between the impact site and the bank from which the developer purchases credits.

To understand why concerns surfaced, one needs to realize that mitigation markets are "unnatural," in the sense that they would not exist without regulation. Unlike a "natural market," such as the bicycle market, mitigation markets present two potential types of failure. The first is a "front end" problem of poor instrument design. The second is a "back end" problem of inadequate monitoring and implementation. In particular, mitigation banking has faced serious concerns over currency choice on the front end and quality control and migration on the back end.

A. Currency Choice

All environmental trading markets, whether exchanging sulfur dioxide, halibut, chlorofluorocarbons, or wetlands, are created by regulation. In cap-and-trade programs, the government sets a limit for emissions or resource consumption, creates a new form of property (such as sulfur dioxide allowances), and permits regulated sources to trade the property in order to comply. In mitigation markets, as we have seen, the government creates property in the form of mitigation credits and allows those to be purchased as an offset to the loss of streams or wetlands or species to development. In all of these regulatory markets, a fundamental issue is determining the trading metric—the "currency."[52]

It is the currency that establishes what is being traded and therefore protected. Currencies drive the structure of all environmental markets, directly influencing their construction, rules of exchange, and provision of public participation. Whether we can confidently trade "x" for "y" depends on what we are trying to maximize. Put simply, unless the currency captures what we care about, we can end up trading the wrong things.

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51. 33 C.F.R. § 325.3(c)(1) (2022). For a thorough explanation of the history and application of the public interest review, see Kevin Cassidy & Craig Johnston, *Tear Down this Wall: Aligning the Corps' Environmental Review Obligations Under NEPA and the Clean Water Act for Section 404 Wetland Permits*, 52 ENV'T L. 395 (2022).

52. *See supra* Part II.

To ensure meaningful wetlands mitigation, for example, the currency must incorporate important values provided by both the wetlands to be lost and the wetlands used for mitigation. Of course, this raises the questions of what the relevant values are, how we measure them, and how we reflect them in a conveniently traded currency. Put another way, since 1988, successive presidential administrations have solemnly pledged to ensure no net loss of wetlands,[53] but what does that mean? No net loss of what? If all that concerns us about wetlands protection is acreage, then the job is simple—identify acres of wetlands lost and restored and count up the net gain or loss in area. That is largely what the Corps did for the first decade of active mitigation banking.[54]

But is that really why we care about wetlands? Isn't it more likely that we care about wetlands, at least in large part, because of their ecosystem services' value to the environment and the economy? If so, then counting acres may make for easy accounting but poor policy. Not all wetlands are created equal. Context matters. Wetlands differ by type, location, and the services they deliver. If one cares about the ability of wetlands to provide flood control, promote water quality, and act as a nursery for fish and wildlife, then acres are a terrible currency because they cannot capture these service values. They necessarily remain absent to the transaction and become uncaptured externalities. In other words, unless currencies can capture some meaningful measure of service provision, wetlands become increasingly nonfungible commodities when their ecosystem values are considered.

We made this point in 2001, arguing that wetland assessment methodologies must be able to capture the provision of valuable services for both the wetlands to be lost and the wetlands used for mitigation.[55] One response at the time was that crude currencies could be overcome by using simple trading ratios. Thus, for instance, where the Corps is uncertain over the true values of services lost and gained, it might require that two or three times as much wetlands area be restored as destroyed. This approach works well if the goal is no net loss of wetlands *acreage*, but fails to address meaningfully the conservation of wetlands *services*.[56] The loss from filling a wetland that provides a valuable service to a community of upstream flood control cannot be meaningfully compensated by restoring twice as much wetlands that provide little flood control or, taking into account landscape context,

53. *See, e.g.*, Bush, Remarks to Members of Ducks Unlimited, *supra* note 32.

54. *See generally* NAT'L RSCH. COUNCIL, COMPENSATING FOR WETLAND LOSSES UNDER THE CLEAN WATER ACT 60–81 (2001).

55. James Salzman & J.B. Ruhl, *Currencies and the Commodification of Environmental Law*, 53 STAN. L. REV. 607, 648–68 (2000) [hereinafter *Commodification*].

56. *Id.*

that provide flood control downstream of the town. Two times zero is still zero.

Comprehensive reviews of assessment methodologies of wetlands mitigation banks in 1992 and 1993 concluded that only a small number employed a broadly tailored method (a complex currency), while among the rest "debiting and crediting transactions are based on two basic currencies—acreage and functional replacement."[57] Our review in the early 2000s of assessment methodologies found that explicit measures of service values remained beyond the reach of virtually all methods in use. Despite policies mandating that habitat trading ensure equivalent value and function, most programs were not administered this way. In practice, most habitat trades in wetlands programs were approved on the basis of acres, in many instances ensuring equivalence in neither value nor function.[58]

Upon reflection, this should not have been surprising. If parties have a choice between a complex (and expensive) currency or a simple and less expensive metric, and both deliver a 404 permit, simplicity will always win, even if it does not provide a better result on the ground. Thus, given the choice in the habitat context of acres or complicated measures of value, acreage won. In a variant of Gresham's Law, wetlands mitigation banking will use the simplest and most expedient assessment method that the relevant regulatory bodies will approve.

There were two comprehensive studies of mitigation banking in the early 2000s. In 2001, a National Research Council committee issued a 322-page report on wetlands mitigation.[59] The very first of the committee's principal findings was that "the goal of no net loss of wetlands is not being met for wetland functions by the mitigation program."[60] To be clear, the report did not conclude that there *had* been net loss. Rather, the data were not available to assess loss of services. The currency of acreage could not answer this question.[61]

B. Who Cares About Quality?

As noted above, mitigation banking is entirely a creation of regulation. As a result, basic assumptions we make about market transactions may not hold. Assume, for example, that Alpha sells a bike to Beta. Beta has every reason to ensure that the bike works well and will hold up for her rides around town. This transaction has a built-in

57. Institute for Water Resources, U.S. Army Corps of Engineers, IWR Rep. 94-WMB-4, National Wetland Mitigation Banking Study First Phase Report 18–19 (1994).

58. *See* Env't L. Inst., Wetland Mitigation Banking app. B (1993).

59. *See* Nat'l Rsch. Council, Compensating for Wetland Losses Under the Clean Water Act (2001).

60. *Id.* at 2.

61. *Id.*

quality check. Alpha wants to make money on the transaction but Beta does not want to overpay for the bike. Both care about quality. Mitigation banking, however, does not work in a similar manner. Quality is not valued.

Indeed, the developer has virtually no interest in the quality of the wetlands being restored. He simply wants a permit from the Corps. Similarly, the banker doesn't care about the quality of the wetlands, either. She simply wants the Corps to sign off so she can sell credits. She is supposed to maintain restored wetlands after the credits have been sold, of course, but will likely only do so if compliance monitoring and enforcement by the Corps are likely. Thus in all key respects, the central player in all this is the Corps. There is no invisible hand at work here. It falls on the agency assessing the bank and releasing permits, which is not a market participant, to ensure the quality of the restored wetlands because neither the buyer nor the seller has an incentive to do so.

The Corps felt dual pressures—protecting wetlands under the 404 program and also ensuring the mitigation market was successful. As we have shown in previous work, the Corps felt strong political "pressure to loosen the timing restrictions of the Federal Guidance and other exchange adequacy safeguards and openly discussed relaxation of its restrictions."[62] Ideally, from the perspective of land developers and bank sponsors, this could take the form of a nationwide market with few restraints on trade.[63] A 2005 General Accounting Office evaluation made clear that this was not a theoretical concern. It found that Corps guidance on compensation oversight had been lax and inconsistent, and enforcement of compensatory mitigation permit conditions was rare.[64] In this setting, the Corps could not ensure that the section 404 program was contributing to the national goal of no net loss of wetlands.[65]

C. Migration

As with all real estate, the economic driver of mitigation banking is location, location, location. Mitigation bankers make money because it is less expensive to create a large bank distant from the impact site. It should be no surprise that the economics of compensatory mitigation inherently shifts wetlands across landscape scales from urban to rural areas. Developers generally seek high-value land in urban areas whereas

62. *Commodification*, *supra* note 55, at 667.

63. *Id.* at 668.

64. U.S. Gov't Accountability Off., GAO-05-898, Wetlands Protection: Corps of Engineers Does Not Have an Effective Oversight Approach to Ensure that Compensatory Mitigation Is Occurring 4 (2005).

65. *Id.* at 27.

mitigation bankers seek less expensive properties in rural areas, often farmland.

There is nothing inherently wrong with this dynamic if the measure of no net loss is acreage. If one is concerned about net loss of services, however, then this "migration pressure" looks very different. The value of services such as flood drainage, nutrient retention, and recreational and cultural values is all location specific. Provision of recreational services is much less valuable if people are not close by to enjoy them. If one is concerned about environmental justice, then market-driven "migration" of wetlands across the urban-rural landscape becomes particularly important.

As noted earlier, even if a restored wetland provides the same biophysical level of services as the filled wetland, the services may have little or no value if they are not delivered to a population that needs them.[66] This is an issue of distributional equity—who is winning and who is losing through mitigation trades? As early as 1997, researchers had pointed out that mitigation would likely have distributional consequences, leading to service migration from urban to rural areas.[67] We predicted this in our 2001 article.[68]

In 2006, we published the results of a detailed geographic study of all the mitigation banks in Florida and the impact sites that purchased credits from them.[69] The result was just as our theory predicted. We found that trades, even in the same watershed, on average involved a distance of fifteen miles from impact sites to markedly more rural locations. This produced "a transfer of wetlands from highly urbanized, high-population density areas to more rural low-population density areas."[70] Trades on average were moving wetlands out of areas where they could provide valuable services to urban populations and into sparsely populated areas where, most likely, their service provision was either redundant or less valuable. These findings were replicated in other studies focused on the Chicago area.[71]

66. *See supra* note 55 and accompanying text.

67. Dennis M. King & Luke W. Herbert, *The Fungibility of Wetlands*, NAT'L WETLANDS NEWSL. (Env't L. Inst.), Sept.–Oct. 1997, at 11.

68. *See Commodification*, *supra* note 55, at 666.

69. J.B. Ruhl & James Salzman, *The Effects of Wetland Mitigation Banking on People,* NAT'L WETLANDS NEWSL. (Env't L. Inst.), Mar.–Apr. 2006, at 9–10.

70. King & Herbert, *supra* note 67, at 11.

71. *See* Todd BenDor & Nicholas Brozović, *Determinants of Spatial and Temporal Patterns in Compensatory Wetland Mitigation*, 40 ENV'T MGMT. 349, 350, 352 (2007).

IV. 2008 Corps Regulations

A. Adding an Ecosystem Services Impact Assessment Mandate

Given these concerns, we and others argued that the goal of no net loss could not be meaningfully assessed, much less achieved, unless the currency changed. There needed to be a concerted effort to develop and apply measures of ecosystem service loss and gain in mitigation banking. Although ecological assessments of wetland impact and mitigation sites had long been required as part of the Corps permitting process, ecosystem service assessments were not, and the former was not a proxy for the latter.

These critiques gained attention at the Corps and EPA. Since the 1989 regulations, section 404's compensatory mitigation program had been administered under a mishmash of guidance, interagency memoranda, and other policy documents issued over the span of seventeen years. In 2008, the program was brought under one comprehensive regulatory framework. The 2008 Rule also introduced ecosystem services into the mitigation decision-making standards for the first time, including recognition of the migration problem described above.[72]

After adoption of these new regulations, the role of ecosystem services in the compensatory mitigation program could be summarized as follows:

- The Corps may require on-site, off-site, or a combination of on-site and off-site compensatory mitigation to replace permitted losses of aquatic resource services.
- Compensatory mitigation should be located within the same watershed as the impact site and should be located where it is most likely to successfully replace lost ecosystem services.
- When off-site compensatory mitigation is used, specific consideration should be given to ecosystem services that will need to be addressed at or near the areas impacted by the permitted impacts.

Yet the rule contained no language to guide implementation of these requirements. For example, the provision requiring permittees to develop mitigation plans did "not require assessment of ecosystem services at the impact site as part of the 'baseline information' that the permittee must compile."[73] As the regulations cautioned,

> [a]lthough the services provided by aquatic resource functions are important to consider when determining the type and location of compensatory mitigation projects[,] there are few methods available for assessing services. Therefore, in most cases

72. *See* Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19594, 19595 (Apr. 10, 2008).

73. Ruhl et al., *supra* note 15, at 264 (quoting 33 C.F.R. § 332.4(c)(5) (2022)).

> consideration of services will be conducted through best professional judgment.[74]

On paper, the 2008 Rule represented a major advance in the consideration of ecosystem service for mitigation banking. As we described in the Introduction to this Article, the fiftieth anniversary of the CWA presented a welcome opportunity to revisit the regulations and answer the straightforward questions: Has the 2008 Rule been implemented and has it made a difference on the ground? As we explain in the next Part, however, these questions proved anything but straightforward to answer.

B. How Has the Ecosystem Services Mandate Been Implemented?

Before assessing the Corps' post-rule implementation, it is useful to establish a reference point for how other resource agencies have integrated ecosystem services into decision making over the past decade. For that, we turn to the U.S. Forest Service, which has been a leading force in integrating the ecosystem services framework into its programs.[75] We then examine how the Corps stacks up.

1. The U.S. Forest Service

Pursuant to its mandates and authorities to manage the national forests,[76] the Forest Service promulgates a "Planning Rule" governing the Agency's development of individual land and resource management plans (LRMPs) for each national forest.[77] The Forest Service has promulgated five successive versions of the Planning Rule since 1979, many of which have been hotly contested and some of which have been invalidated by federal courts.[78] The latest Planning Rule, which was

74. Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19594, 19659 (Apr. 10, 2008).

75. *See* J.B. Ruhl & James Salzman, *Ecosystem Services and Federal Public Lands: A Quiet Revolution in Natural Resources Management*, 91 U. COLO. L. REV. 677, 692–93 (2020) [hereinafter *Quiet Revolution*].

76. *See id.* at 686–87, 686 n.25, 687 nn.27 & 33 (first citing Organic Administration Act of 1897, 55 Cong. Ch. 2, 30 Stat. 11, 34–36 (codified as amended at 16 U.S.C. §§ 473–475, 477–482, 551); then citing Multiple Use and Sustained Yield Act of 1960, Pub. L. No. 86-517, 74 Stat. 215 (June 12, 1960) (codified as amended at 16 U.S.C. §§ 528–531); and then citing National Forest Management Act, Pub. L. No. 94-588, 90 Stat. 2949 (Oct. 22, 1976) (codified as amended at 16 U.S.C. §§ 1600–1614)) (describing the "three principal statutes" under which the Forest Service manages national forests).

77. *See generally* National Forest System Land Management Planning, 77 Fed. Reg. 21,162 (Apr. 9, 2012) (codified at 36 C.F.R. § 219).

78. *See id.* (covering the history); Citizens for Better Forestry v. USDA, 632 F. Supp. 2d 968, 970–73, 982–83 (N.D. Cal. 2009) (explaining history of the rule).

promulgated in 2012 and has thus far withstood both judicial review and further agency substantive modification,[79] added a new requirement that responsible LRMP officials identify and evaluate ecosystem service benefits that people obtain from national forests.[80] The Forest Service's "all in" commitment to the ecosystem services framework is evident throughout the final 2012 Planning Rule, with well over one hundred references to "ecosystem services" in the preamble and rule texts. The preamble explains that "[t]he rule contains a strong emphasis on protecting and enhancing water resources, restoring land and water ecosystems, and providing ecological conditions to support the diversity of plant and animal communities, while providing for ecosystem services and multiple uses."[81]

The Forest Service implements its Planning Rule through policies known as the "Directives," the collection of which is assembled into the Land Management Planning Handbook ("Handbook"). The Agency amended the Directives in 2015 to reflect the 2012 Planning Rule and its focus on ecosystem services.[82] As outlined in the 2012 Planning Rule, the updated Handbook emphasizes the "influence area" of a national forest and the goal of "identifying relationships between the management of the plan area and social, cultural, and economic conditions outside the plan area."[83] The Handbook now recognizes that national forest contributions "include ecosystem services . . . from the plan area that provide benefits to people either directly or indirectly."[84] In that respect, a new Handbook section devoted exclusively to ecosystem services evidences the Agency's emerging emphasis on providing regulatory and support services outside of the boundaries of national forests. As the Handbook explains:

79. National Forest System Land Management Planning, 77 Fed. Reg. at 21,162.

80. 36 C.F.R. § 219.6(b)(7).

81. National Forest System Land Management Planning, 77 Fed. Reg. at 21,163.

82. *See 2012 Planning Rule Final Directives*, U.S. DEP'T OF AGRIC., FOREST SERV., https://www.fs.usda.gov/detail/planningrule/home/?cid=stelprd3828310 [https://perma.cc/67FX-RZ4B] (last visited Oct. 12, 2022). The Forest Service Handbook is not a book per se, but rather a collection of ongoing directives organized by series of topics. The planning topic is found in the 1900 series, and the Land and Resources Management Planning Handbook is found in the 1909.12 series. *See generally* FOREST SERV., U.S. DEP'T OF AGRIC., FOREST SERVICE HANDBOOK (FSH) 1909.12, https://knrc.org/ARRG/FSH_1909-12_Land_Management_Planning_Handbook.pdf [https://perma.cc/A2WY-E4F8] (last visited Oct. 5, 2022) [hereinafter FSH].

83. FSH 1909.12, *supra* note 82, at § 13.

84. *Id.* § 13.1.

> Management of the plan area will affect the contribution of some ecosystem services, which affect social, cultural, and economic conditions. For example, a cultural service such as access to and protection of a cultural site or area can benefit tourism businesses, cultural values, and traditional uses of nearby communities. A regulating service, such as flood control, can have important beneficial consequences both within and beyond the plan area.[85]

The Handbook thus instructs LRMP development teams to identify and evaluate ecosystem services at the "geographic scale at which the plan area contributes the key ecosystem service (for example, watersheds, counties, regional markets, or ecoregions)" and also recognizes that lands and conditions outside of a national forest may "influence the plan area's ability to provide the key ecosystem services."[86]

Contemporaneous with these developments, on October 7, 2015, three offices within the Executive Office of the President—the Office of Management and Budget, Council on Environmental Quality, and Office of Science and Technology—issued their Memorandum for Executive Departments and Agencies on Incorporating Ecosystem Services into Federal Decision Making ("EOP Memorandum").[87] It "[d]irect[ed] agencies to develop and institutionalize policies to promote consideration of ecosystem services, where appropriate and practicable, in planning, investments, and regulatory contexts."[88] To establish the baseline, the EOP Memorandum required agencies to submit a report within six months of receipt of the memorandum describing their current incorporation of ecosystem services in decision-making and establishing a work plan.[89]

The Forest Service delivered its report on April 4, 2016.[90] The Agency organized its response around three goals, including providing

85. *Id.* § 13.12.

86. *Id.*

87. Memorandum on Incorporating Ecosystem Services into Federal Decision Making from Shaun Donovan, Dir., Office of Mgmt. and Budget, Christina Goldfuss, Managing Dir., Council on Env't Quality, & John Holdren, Dir., Office of Sci. and Tech. Pol'y (Oct. 7, 2015), https://obamawhitehouse.archives.gov/sites/default/files/omb/memoranda/2016/m-16-01.pdf [https://perma.cc/J3W4-M5SM].

88. *Id.*

89. *Id.* (the deadline was March 30, 2016).

90. U.S. DEP'T OF AGRIC., FOREST SERV., USDA FOREST SERVICE RESPONSE TO THE EXECUTIVE OFFICE OF THE PRESIDENT MEMORANDUM OF OCTOBER 7, 2015: INCORPORATING ECOSYSTEM SERVICES INTO FEDERAL DECISION MAKING (2016).

"benefits to the public."[91] The report brims with discussion of how the national forests can provide ecosystem services benefits beyond their boundaries and what the Agency is doing to advance its science and policies to realize that goal. In particular, the report emphasizes provision of clean water and carbon sequestration and also explains that staff are undergoing training "focused more specifically on impact investing opportunities (a much newer field for federal agencies, including our own)."[92] Overall, the report represented the culmination of almost a decade of gradual but unmistakable movement of the Forest Service toward the ecosystem services framework—to the point that by 2016 it had become central to the Agency's mission. This momentum slowed substantially during the Trump Administration but survived through continued scientific research supporting implementation.[93] Although by our assessment the first generation of plans using the 2012 Planning Rule did not produce robust ecosystem services evaluations and plans, the Agency clearly was committed to a learning curve.

Anyone today wishing to review whether and how much the Forest Service has included ecosystem services in planning for a particular national forest can quickly find the relevant documents: simply search online by the name of the national forest and access "Planning" from the "Managing the Land" tab at the top of the home page, which will lead to links to all relevant documents. Generally, the most in-depth discussion of ecosystem services will be found in the National Environmental Policy Act (NEPA) compliance documentation—i.e., the draft or final Environmental Impact Statement (EIS). Bearing in mind that not all national forests have updated plans using the 2012 Planning Rule, those that have reached that stage have produced robust analyses of plan alternatives on the provision of ecosystem services. For example, the draft EIS for the Ashley National Forest in Utah includes extensive discussion of ecosystem services for the various plan alternatives.[94]

2. The U.S. Army Corps of Engineers

By contrast, the Corps has done little to articulate its ecosystem services assessment policy beyond the gestures in the 2008 Rule. We searched exhaustively for implementation policy documents and other guidance materials and consulted with expert researchers and practitioners, finding no evidence of the kind of build-out the Forest

91. *Id.* at 1.

92. *Id.* at 15.

93. *Quiet Revolution*, *supra* note 75, at 693–94.

94. U.S. DEP'T OF AGRIC., FOREST SERV., DRAFT ENVIRONMENTAL IMPACT STATEMENT, ASHLEY NATIONAL FOREST PLAN REVISION 201–15 (Nov. 2021), https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd973374.pdf [https://perma.cc/FSC4-VRS5].

Service used to extend its 2012 Planning Rule into field practice. Ironically, the water resources management branch of the Corps, which "focuse[s] on water-borne navigation and flood control with the aim of balancing economic and environmental concerns," embraced the ecosystem services framework soon after the section 404 regulatory branch promulgated the 2008 Rule. "The Corps initiated a work unit tasked with exploring the challenges and opportunities of integrating ecosystem services into the Corps' [water management] planning efforts," the ultimate goal being "to develop a practical framework for incorporating analysis of ecosystem services in planning processes and for evaluating management alternatives."[95] The unit produced two extensive reports in 2013[96] and another in 2020.[97] We found no evidence of cross-fertilization between this work and the section 404 regulatory program branch. To be sure, the scale of the Corps' water management projects is far larger than the typical land development project requiring a section 404 permit, but the contrast in progress between the two sides of the Agency is striking.

There also is no easy way to access Corps permit documentation that would contain ecosystem services impact assessments, if any are conducted. The Corps maintains what it calls a "Permit Finder" site, which provides basic information on pending and final permits but

95. *See* Christy Ihlo & Lydia Olander, *Approach of the U.S. Army Corps of Engineers*, NAT'L ECOSYSTEM SERVS. P'SHIP, https://nespguidebook.com/ecosystem-services-and-federal-agencies/us-army-corps-of-engineers-agency-context/ [https://perma.cc/AQ73-QZ2Z] (last visited Oct. 13, 2022).

96. DENISE REED, LYNN MARTIN & JANET A. CUSHING, U.S. ARMY CORPS OF ENG'RS, 2013-R-07, USING INFORMATION ON ECOSYSTEM GOODS AND SERVICES IN CORPS PLANNING: AN EXAMINATION OF AUTHORITIES, POLICIES, GUIDANCE, AND PRACTICES (2013), https://www.iwr.usace.army.mil/Portals/70/docs/iwrreports/EGS_Policy_Review_2013-R-07.pdf [https://perma.cc/HH5B-ZAGE]; DAVID J. TAZIK, JANET CUSHING, ELIZABETH MURRAY & LISA WAINGER, U.S. ARMY CORPS OF ENG'RS, ERDC/EL TR-13-17, INCORPORATING ECOSYSTEM GOODS AND SERVICES IN ENVIRONMENTAL PLANNING: A LITERATURE REVIEW OF DEFINITIONS, CLASSIFICATION AND OPERATIONAL APPROACHES (2013), https://apps.dtic.mil/sti/pdfs/ADA584398.pdf [https://perma.cc/M275-H5KB].

97. LISA A. WAINGER, ANNA MCMURRAY, HANNAH R. GRISCOM, ELIZABETH O. MURRAY, JANET A. CUSHING, CHARLES H. THEILING & SHAWN KOMLOS, U.S. ARMY CORPS OF ENG'RS ECOSYSTEM MGMT. & RESTORATION RSCH. PROGRAM, ERDC/EL SR-20-2, A PROPOSED ECOSYSTEM SERVICES ANALYSIS FRAMEWORK FOR THE U.S. ARMY CORPS OF ENGINEERS (2020), https://erdc-library.erdc.dren.mil/jspui/bitstream/11681/37741/3/ERDC-EL%20SR-20-2.pdf [https://perma.cc/7BQ3-8RKN].

provides no links to any permit decision documentation.[98] Another site, known as Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS), identifies mitigation banks and their credit balances, but provides no links to the permitted impact development sites or to their permit decision documentation.[99] Using these two sites, brute force, and some luck, one can identify permits that likely involved significant impacts to resources and thus may have affected provision of ecosystem services. One must then contact the appropriate Corps field office and, referencing the specific permit, request digital copies of NEPA and other decision documents via a Freedom of Information Act (FOIA)[100] request.

To field-test this approach with a small sample, based on what could be gleaned from Permit Finder and RIBITS we identified several permits issued in urban areas that appeared to have significant impacts in terms of required mitigation credits. The Corps promptly provided the documents we identified in a FOIA request for two of the projects. Without going into deep details, we can report that the experience is not the same as accessing Forest Service plans. In one case we simply misjudged the nature of the project, which turned out to be remediation of a contaminated industrial site. The Corps provided us the Memorandum for Record document, which includes the summary of the public interest review. As one might expect, the remediation project improved local conditions. The other project involved a new five-mile railway link along the Coweeman River in Washington, impacting a long, narrow 6.8-acre corridor of wetlands and using credits from a nearby bank to offset impacts. The entire development site was within the city of Kelso and in the river floodplain, and the bank was located east of the city in the river watershed. The Corps provided the entire administrative record, comprising hundreds of pages, in which we located the Memorandum for Record.[101] The public interest review summarily concluded that the compensatory mitigation would offset impacts in the relevant watershed. We could not locate any discussion relevant to the 2008 Rule requirement that specific consideration should be given to ecosystem services that will need to be addressed at or near the areas affected by the permitted impacts.

We decided not to devote further time and resources to defining Corps implementation of the ecosystem services component of the

98. *USACE Jurisdictional Determinations and Permit Decisions*, U.S. ARMY CORPS OF ENG'RS, https://permits.ops.usace.army.mil/orm-public [https://perma.cc/3ZC9-TEF2] (last visited Oct. 13, 2022).

99. REGULATORY IN-LIEU FEE AND BANK INFORMATION TRACKING SYSTEM, https://ribits.ops.usace.army.mil/ords/f?p=107 [https://perma.cc/6PQ3-8G4Z] (last visited Oct. 13, 2022).

100. 5 U.S.C. § 552.

101. *See* Memorandum for Record from the U.S. Army Corps of Eng'rs, Application NWS-2013-1152 (June 15, 2015) (on file with authors).

2008 Rule. We could find no Corps policies or guidance like those the Forest Service has produced. The public interest reviews in the decision documents provided no useful way to assess effects on provision of ecosystem services. Over time with repeated efforts, we may have improved our success rate in identifying projects with significant impacts, and we may have recovered documents containing ecosystem services impact assessments, if the Corps conducts any, or interpreted the public interest reviews as proxies. With sufficient funding and research assistant capacity, we might even be able to compile regional-scale comprehensive analyses of whatever ecosystem impact assessment the Corps provides or we could interpret. But the underlying problem is, why should we have to? Why should anyone have to take such a roundabout, labor-intensive path to compiling such information?

V. Going Forward with Urban Ecosystem Services

If accounting for services and providing easy public access to relevant assessment documents were merely satisfying a needless regulatory requirement, then arguably the Corps' failure to do so would be unimportant. We argue below, though, that not accounting for distributional gain and loss of services and not facilitating public access has very real consequences, particularly for urban environmental justice concerns.

In addition to federal agency adoption, such as by the Forest Service as described above, the ecosystem services framework has been gaining traction in local governance.[102] As stressed in a 2011 publication by The Economics of Ecosystems and Biodiversity (TEEB), entitled *Manual for Cities: Ecosystem Services for Urban Management*, the importance of cities participating in this global initiative cannot be overstated—urban areas are home to over half the world's population, making cities the chief consumers of ecosystem services.[103] There has been an explosion of interest in urban ecosystem services in scientific and policy research over the past decade,[104] with strong connections to

102. *See* J.B. Ruhl, *Beyond Green Infrastructure—Integrating the Ecosystem Services Framework into Urban Planning Law and Policy*, 4 J. Compar. Urb. L. & Pol'y 221 (2020).

103. André Mader, Shela Patrickson, Elisa Calcaterra & Jacques Smit, The Econs. of Ecosystems & Biodiversity, TEEB Manual for Cities: Ecosystem Services in Urban Management 2 (2011), http://doc.teebweb.org/wp-content/uploads/Study%20and%20Reports/Additional%20Reports/Manual%20for%20Cities/TEEB%20Manual%20for%20Cities_English.pdf [https://perma.cc/L8RK-6GHS].

104. *See* Francesc Baró, Ignacio Palomo, Grazia Zulian, Pilar Vizcaino, Dagmar Haase & Erik Gómez-Baggethun, *Mapping Ecosystem Service Capacity, Flow and Demand for Landscape and Urban Planning: A Case Study in the Barcelona Metropolitan Region*, 57 Land Use Pol'y 405

research on urban green infrastructure as a source of regulating and supporting services.[105]

One policy challenge with respect to provision of urban ecosystem services is that as urbanization displaces natural capital resources such as wetlands, the supply of natural capital in the area dwindles and space for inclusion of new green infrastructure runs low.[106] The solution all too often is to rely on more compact technological infrastructure (e.g., a concrete stormwater collector), which is effective at its single purpose but does not provide the suite of regulating and supporting services an area of wetlands can provide. Green infrastructure thus might provide less effective stormwater control than its technological counterpart in the same geographic footprint, but it is also supplying

(2016); Wanxu Chen, Guangqing Chi & Jiangfeng Li, *The Spatial Aspect of Ecosystem Services Balance and Its Determinants*, 90 LAND USE POL'Y 104263 (2020); Fengqi Cu, Haiping Tang, Qin Zhang, Bojie Wang & Luwei Dai, *Integrating Ecosystem Services Supply and Demand into Optimized Management at Different Scales: A Case Study in Hulunbuir, China*, 39 ECOSYSTEM SERVS. 100984 (2019); Chiara Cortinovis & Davide Geneletti, *A Framework to Explore the Effects of Urban Planning Decisions on Regulating Ecosystem Services in Cities*, 38 ECOSYSTEM SERVS. 100946 (2019); Peer von Döhren & Dagmar Haase, *Risk Assessment Concerning Urban Ecosystem Disservices: The Example of Street Trees in Berlin, Germany*, 40 ECOSYSTEM SERVS. 101031 (2019); Jeannette Sieber & Manon Pons, *Assessment of Urban Ecosystem Services Using Ecosystem Services Reviews and GIS-Based Tools*, 115 PROCEDIA ENG'G 53 (2015); Junyi Hua & Wendy Y. Chen, *Prioritizing Urban Rivers' Ecosystem Services: An Importance-Performance Analysis*, 94 CITIES 11 (2019). For a survey of scientific and legal scholarship on urban ecosystem services prior to this wave, see Ruhl & Salzman, *supra* note 14, at 158–61.

105. *See* Judy Bush & Andréanne Doyon, *Building Urban Resilience with Nature-Based Solutions: How Can Urban Planning Contribute?*, 95 CITIES 102483 (2019); Luyuan Li, Pieter Uyttenhove & Veerle Van Eetvelde, *Planning Green Infrastructure to Mitigate Urban Surface Water Flooding Risk—A Methodology to Identify Priority Areas Applied in the City of Ghent*, 194 LANDSCAPE & URBAN PLAN. 103703 (2020); Ricardo A.S. Machado, Anderson G. Oliveira & Rubén C. Lois-González, *Urban Ecological Infrastructure: The Importance of Vegetation Cover in the Control of Floods and Landslides in Salvador/Bahia, Brazil*, 89 LAND USE POL'Y 104180 (2019); Silvia Ronchi, Andrea Arcidiacono & Laura Pogliani, *Integrating Green Infrastructure into Spatial Planning Regulations to Improve the Performance of Urban Ecosystems. Insights from an Italian Case Study*, 53 SUSTAINABLE CITIES & SOC'Y 101907 (2020); Sining Zhang & Francesc Muñoz Ramírez, *Assessing and Mapping Ecosystem Services to Support Urban Green Infrastructure: The Case of Barcelona, Spain*, 92 CITIES 59 (2019).

106. *See* Francesc Baró, Dagmar Haase, Erik Gómez-Baggethun & Niki Frantzeskaki, *Mismatches Between Ecosystem Services Supply and Demand in Urban Areas: A Quantitative Assessment in Five European Cities*, 55 ECOLOGICAL INDICATORS 146, 147, 156 (2015) (The cities were Barcelona, Berlin, Stockholm, Rotterdam, and Salzburg).

other benefits that concrete cannot. This kind of trade-off research on urban ecosystem services can help inform local governments as a matter of urban policy choice.

The 2008 Mitigation Rule recognized that the Corps is essentially making that kind of trade-off decision for cities when it approves an impact site that depletes urban wetlands and uses a distant rural mitigation bank for its required credits. The cumulative effect of many such decisions could have significant implications for the distribution of wetland services in a metropolitan area.

Should we be concerned about this market-driven shift of wetlands from urban to rural areas, even if it simply reflects the efficiency of trading? If we care about the equity of who receives wetland services and their value, then the answer is yes, and we should closely examine the redistribution of wetland service values within the environment and between human populations. Are there identifiable groups that would be harmed by conversion in one area if they are not compensated by mitigation in another? If so, how severe is that loss of services, and what mechanisms might be put in place to compensate these populations losing the benefits of wetland ecosystem services?

These questions operate at a community level and are likely to become increasingly salient as climate change puts pressure on urban systems generally, making urban ecosystem services both more valuable and more threatened. Citizens, journalists, and policy researchers should be able to assess their community's ecosystem services balance sheets. Greater public knowledge could influence impact site permitting and mitigation bank locations and help people evaluate choices among the three main mitigation methods (permittee-responsible, in-lieu fee, and mitigation banking). Those choices are important because permittee-responsible mitigation still occurs. Indeed, one argument supporting in-lieu fee programs over private banking is that centralized planning allows more informed choices of mitigation sites.

We do not mean to suggest that the Corps is intentionally stonewalling public access to information about ecosystem services tradeoffs. Nor is the Corps alone. As a multidisciplinary study recently found, biodiversity offset programs surveyed from many different nations lacked accessibility and transparency.[107] But anyone concerned about the impact of Corps permitting on the provision of ecosystem services in their community should be in a position to easily access Corps permit decision documentation and locate the ecosystem services impact assessment, if any, for permits with significant impacts to wetland resources. As the study proposes, a reliable and credible

107. Heini Kujala, Martine Maron, Christina M. Kennedy, Megan C. Evans, Joseph W. Bull, Brendan A. Wintle, Sayed M. Iftekhar, Katherine E. Selwood, Kahli Beissner, Dave Osborn & Ascelin Gordon, *Credible Biodiversity Offsetting Needs Public National Registers to Confirm No Net Loss*, 5 ONE EARTH 650, 650 (2022).

tracking system must at a minimum provide information regarding the proposed offset action and its outcome and be designed to facilitate adaptive policy improvement.[108] Like the Forest Service, the Corps could include a dedicated discussion of ecosystem services in its NEPA documentation and permit Memorandum for Record. Corps field offices could populate a central online library of permit documentation for all permits requiring a NEPA EIS, which are the most likely to have significant ecosystem services impacts, as well as the decision documents for any projects not requiring an EIS but having identifiable impacts on ecosystem services. The library could be searchable, and the Permit Finder and RIBITS sites can also link directly to it. Of course, this kind of facilitated public access is only useful if the Corps follows through meaningfully on the 2008 Mitigation Rule and conducts and documents ecosystem services impact assessments. Given the progress the water management branch of the Agency has made in developing methods for ecosystem services assessments in its planning, the knowledge base is there from which to develop systematic guidance for Corps field offices to assess and document impacts to ecosystem services from section 404 permits.

CONCLUSION

Fifty years ago, Congress did not have wetlands or mitigation banking in mind when enacting section 404 of the CWA, and the term "ecosystem services" did not even exist. Since then, first wetlands, then no net loss, then compensatory mitigation, and then mitigation banking entered the mix and have become fixtures in the Corps regulatory program. Ecosystem services is the most recent addition, but in the fifteen years since the Corps promulgated the 2008 Rule, assessment of ecosystem services impacts remains essentially invisible to the public. The Corps has produced no guidance to section 404 permitting staff regarding how to conduct assessments. Corps decision documents are accessible only though FOIA requests, and the Permit Finder and RIBITS platforms are essentially dead ends for anyone hoping to identify projects likely to have involved significant impacts. The Corps' public interest review does not encompass the full suite of wetland ecosystem services and provides no assessment of distributional impacts on services provision when an impact site and the mitigation bank are distant. In short, a community hoping to assess its section 404 permitting ecosystem services balance sheet, thinking it is a matter of simply finding the Corps website and downloading easily identifiable reports, will be sorely disappointed.

As researchers argue, "Not being able to demonstrate, or even evaluate, whether [no net loss] is being achieved in offsetting represents a significant information gap between policy goals and outcomes,

108. *Id.* at 653.

leaving governments and societies without knowledge about the impacts of biodiversity offsetting schemes and unable to improve them."[109] To inform its own trade-off assessments, as well as to inform local governments and affected communities and to facilitate research, a robust, publicly accessible ecosystem services impact assessment should be included in every significant Corps permit decision. Yet, under its present policies and practices, the Corps cannot demonstrate, and the public cannot evaluate, the distributional effects of its section 404 permitting on the provision of ecosystem services. The knowledge base for implementing such assessments is available (and indeed being developed within the water management branch of the Corps), and the technology for providing public access to decision documents is available. With climate change posing severe threats to urban ecosystem services and the vulnerable populations depending on them,[110] investing in making wetlands services "balance sheets" accessible and transparent is more critical than ever.

109. *Id.* at 651.

110. *See* Neil Saintilan, Katya E. Kovalenko, Glenn Guntenspergen, Kerrylee Rogers, James C. Lynch, Donald R. Cahoon, Catherine E. Lovelock, Daniel A. Friess, Erica Ashe, Ken W. Krauss, Nicole Cormier, Tom Spencer, Janine Adams, Jacqueline Raw, Carles Ibanez, Francesco Scarton, Stijn Temmerman, Patrick Meire, Tom Maris, Karen Thorne, John Brazner, Gail L. Chmura, Tony Bowron, Vishmie P. Gamage, Kimberly Cressman, Charlie Endris, Christina Marconi, Pamela Marcum, Kari St. Laurent, William Reay, Kenneth B. Raposa, Jason A. Garwood & Nicole Khan, *Constraints on the Adjustment of Tidal Marshes to Accelerating Sea Level Rise*, 377 SCIENCE 523, 523 (2022) (describing loss of coastal marshes to sea level rise).