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Regulatory thickening and the politics of market-oriented environmental policy

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ABSTRACT

Scholars of environmental market-based policy instruments (MBIs), such as cap-and-trade and biodiversity offsetting programs, have extensively documented MBI's market-like features, including the ways they incentivize producing environmental quality, risk subordinating nature protection to capital accumulation, and are supported by state-driven projects of market-building ('re-regulation'). A less emphasized dimension of MBIs is examined: the ways these institutions are founded upon a substantial thickening of state infrastructural power, which amounts to expanding state control over economic and environmental life in ways that outstrip processes of re-regulation. Appreciating the linkages between MBIs and expanding state control over environmental quality may help explain routine conservative resistance to these policy developments. Affinities between MBIs and regulatory thickening also call into question the degree to which MBIs should be thought of as 'liberalizing' policy instruments and suggests that, perhaps counterintuitively, the growth of MBIs may present new opportunities for expanding public control over environmental quality.

KEYWORDS Market-based instruments (MBIs); regulation; state power; infrastructural power; wetland mitigation banking; ecological offsetting

Social-environmental scholars have long appreciated that market-based instruments (MBIs) are becoming a prominent means of regulating human relationships with nature (Solomon and Gorman 2002, Jordan *et al.* 2003, 2013). Cap-and-trade schemes (Tietenberg 2006, Meckling 2011), payments for ecosystems services schemes (Engel *et al.* 2008), ecological offsetting schemes (Carroll *et al.* 2009, Gardner 2011), and credit-based environmental exchanges of all sorts, from systems for incentivizing electric vehicle production (Moreno 2016) to systems for controlling ethanol markets (Morgenson and Gebeloff 2013), are now ubiquitous in environmental policy. Accordingly, scholars have devoted extensive attention to MBIs, ranging from mathematical-theoretical articulations of the economic

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principles that inform these instruments (e.g. Coase 1960, Dales 1968, Tietenberg 2006), to critical accounts that call into question whether MBIs can be understood as ‘solutions’ to environmental problems at all (e.g. Büscher *et al.* 2014, Dempsey and Suarez 2016, Stuart *et al.* 2017).

As others have pointed out (e.g. Jordan *et al.* 2003, 2013, Bohr 2016), however, there is a disjuncture between this academic research and the real-world politics of market-oriented environmental policy. On the one hand, academics have focused heavily on the ‘market’ and the ‘liberalizing’ features of these institutions, including the now well-recognized role of the state in ‘re-regulating’ MBIs into existence (Vogel 1996, Solomon and Gorman 2002, Castree 2008, Héritier and Rhodes 2011, Jordan *et al.* 2013). On the other hand, and at least a little puzzlingly (see also Jordan *et al.* 2003, p. 205), many conservative and staunchly ‘promarket’ political actors, especially in the United States, have begun to regularly oppose MBIs (Bohr 2016) – and this after American political conservatives initially embraced these policy developments (Cook 1988, Solomon and Gorman 2002, Layzer 2012). What explains this political shift, and how should we understand the widening gap between academic debates and the on-the-ground politics of market-oriented environmental policy?

The answer, I contend, is linked to an underemphasized but critical dimension of the development of MBIs. My thesis is that many market-oriented institutions are founded upon a substantial ‘thickening’ of state control over economic and ecological dynamics, and not just in ways that directly support market-building (cf. Vogel 1996, Fligstein 2001, Jordan *et al.* 2003). Drawing insights from the sociology of markets, political sociology, and studies of regulation *per se*, I show how at least some MBIs are built not just in the ‘shadow of hierarchy’ (cf. Héritier and Rhodes 2011), but directly ‘upon’ it, requiring substantial expansions of what political sociologists refer to as ‘infrastructural power’ (Mann 1993), which can be defined as state control that penetrates ‘through’ a sovereign territory and coordinates social (and ecological) action within it. As I will show, this expansion of infrastructural power is not equivalent – and is often causally prior – to the processes of ‘re-regulation’ usually emphasized in scholarly accounts of MBIs and market-building more generally (cf. Vogel 1996, Castree 2008). Thus, creating MBIs and new markets in ‘neoliberal nature’ (Bakker 2005) depends upon much more than the state-supported creation of new forms of private property, governance structures, and rules of exchange (Fligstein 2001, Polanyi 2001, Carruthers and Ariovich 2004) that, as Castree (2008) puts it, ‘facilitate privatization and marketization of ever-wider spheres of social and environmental life’ (p. 142). In addition to these state-supported market-building processes, the emergence of MBIs also hangs together with real and observable patterns of thickening state control over human relationships with

nature per se – patterns that coincide with expanding regulatory control in many domains of social life (Levi-Faur 2005, 2010, Schneiberg and Bartley 2008, MacNeil and Paterson 2012). In ecological contexts, these regulatory expansions amount to increasing the scope and enforcement of environmental laws themselves – a shift, I suggest, that may provide a basis for growing conservative opposition to MBIs.

To develop my argument, I briefly outline the growing conservative resistance to MBIs, especially in the United States, before introducing and briefly reviewing the policy basics of two prominent but understudied US MBIs – wetland mitigation banking and species conservation banking – to illustrate my argument. I then review the ways most social scientists remain focused on the ‘market’ features of MBIs, even while clearly appreciating the role of the state in creating them. I next show how the concept of infrastructural power helps to historicize and thereby deepen social scientific accounts of MBIs in ways that go beyond the more typical scholarly focus on market-oriented re-regulation. I then shift to an empirical analysis, examining regulatory changes that have supported the development of species conservation and wetland banking. I conclude by discussing the analytical and political implications of more fully accounting for the ways MBIs depend upon these expansions of state infrastructural power, including scope conditions for this argument that need investigation in future research.

From conservative embrace to opposition: a (very) brief history of MBIs

In the late 1980s and early 1990s, when MBIs first began to gain a foothold in environmental policy around the world, center-right and ‘third-way’ political parties (e.g. Green parties in Europe and ‘New Democrats’ in the United States) that generally embraced market-oriented reforms were among MBIs’ key supporters (Jordan *et al.* 2003). In the United States in the late 1980s, for instance, the right-leaning George H. W. Bush administration promoted MBIs for regulating air pollution and acid rain and embraced the exchange-based concept of ‘no net loss of wetlands’ as a key tenant of its environmental policy (Cook 1988, Gardner 2011, Layzer 2012). Later, with strong support from many business groups, the broadly promarket Clinton administration lobbied forcefully for the inclusion of a market-oriented cap-and-trade scheme in the international Kyoto Protocol for regulating greenhouse gas emissions – over the objections of many European counterparts who preferred a simpler carbon tax (McCright and Dunlap 2003, Meckling 2011).

In the United States, however, and perhaps more broadly, right-leaning and market-liberal support of MBIs was already beginning to erode by the

early 2000s. Despite the United States winning the battle to include a cap-and-trade scheme in the international Kyoto Protocol, for instance, the George W. Bush administration and most Republicans in Congress subsequently did not support the agreement and never ratified it. A few years later, conservative political actors in the United States thwarted a second attempt to build a market-oriented cap-and-trade scheme during the center-left Obama administration, again despite fragmented but nonetheless notable support from corporate environmental ‘luminaries’ such as Duke Energy, Pacific Gas & Electric, Shell Oil, BP, Conoco, Alcoa, General Electric, Ford, and Dow Chemical (Broder 2009, U.S. House of Representatives 2009, H6532). More recently, the conservative government in the United Kingdom scuttled *its own* attempt to construct a market-oriented system of ‘biodiversity offsetting’ (Lockhart 2015). In 2017, amidst a flurry of deregulatory actions, the right-wing Trump administration revoked an Obama-era executive order formally directing federal agencies to prioritize the use of wetland mitigation banking as a means of complying with the Clean Water Act (Federal Register 2015, 2017). As I will explain, wetland mitigation banking is an ecologically-focused MBI in which mostly private, for-profit entrepreneurs create and sell ecological offsets to land developers who are legally required to ‘make up’ for the harm they cause to wetland systems.

This growing pattern of conservative opposition to MBIs raises an important question: if MBIs are indeed so market-like and consonant with capitalism, as social scientists and policy scholars regularly emphasize, then why is an ostensibly promarket and probusiness political constituency that initially supported these instruments, such as the Republican Party in the United States, increasingly turning its back on them, often even when powerful business interests favor these approaches?

Bohr (2016) reveals part of the answer: in the case of climate policies, conservatives and market liberals may resist MBIs because of ideological objections to the state interventions necessary to build them – even if MBIs *are* market-like. Yet the regulatory interventions required to build MBIs often go far beyond the state-directed work of creating ‘unnatural’ markets in things such as carbon, sulfur dioxide, or species and wetland credits. MBIs are intimately bound up in expanding state control over environmental quality per se – an anathema to many political conservatives.

Wetland mitigation and species conservation banking: a brief policy review

Wetland mitigation banking and species conservation banking are market-oriented policy approaches to nature protection that emerged in the late 1980s and early 1990s in the United States. Wetland mitigation banking

evolved out of legal mandates for land developers to ‘mitigate’ or ‘offset’ harm to wetlands habitats caused by building new roads and housing. These offsetting requirements stem from section 404 of the federal Clean Water Act of 1972 (CWA), which authorizes the Secretary of the Army to ‘issue permits... for the discharge of dredged or fill material into the navigable waters’ of the United States (United States, 2018). Drawing on this authority, and since the aforementioned embrace of ‘no-net-loss of wetlands’ by President H. W. Bush in 1988, the Army Corps of Engineers has increasingly included demands for wetland offsets as a condition for receiving a 404 permit (Environmental Law Institute 1994, Gardner 2011).

Species conservation banking is an analogous MBI focused on endangered species habitat rather than on wetlands. Where enforced, mandates for land developers to ‘mitigate’ (again, to ‘offset’) unavoidable harm to endangered species habitat stem from the Endangered Species Act of 1973 (ESA), which the U.S. Fish and Wildlife Service and the National Marine Fisheries Service administers (hereafter, the Services). The Services do not directly issue permits that allow land developers to engage in construction the way the Army Corps does, but land development projects that could impact an officially listed endangered species are required to go through a ‘consultation process’ led by Service biologists. These government biologists, in turn, make recommendations to permitting agencies (e.g. the Army Corps or a local building department) for actions that the land developer should take to avoid, minimize, and potentially offset the harm that might be caused to a listed species. The permitting agency typically includes the Services’ recommendations as a condition of the permit issued to the land developer.

Since the mid-1990s, when both wetland and species offsets started to become routine permit requirements imposed by government regulators, private entrepreneurs have increasingly built for-profit wetland mitigation and species conservation ‘banks.’ These are swaths of restored wetlands and streams or tracts of endangered species habitat that wetland mitigation (or species conservation) ‘bankers’ then parse into wetland (species) ‘credits’ that are, in turn, sold to land developers and public agencies in need of either wetland or species ‘mitigation’ to satisfy permit requirements. Hence the market-like character of these institutions: private actors mostly create species and wetland credits and sell them for a profit on an ‘open market’ to land developers who need offsets.

Partly because of their legal-ecological overlaps, species conservation banking and wetland mitigation banking grew up together in the United States. Neither MBI existed in the early 1980s, but they both developed and grew exponentially through the 1990s and their use continues to expand (Figure 1). The number of wetland mitigation banks expanded from around 40 in 1992 – only one of which was privately owned and

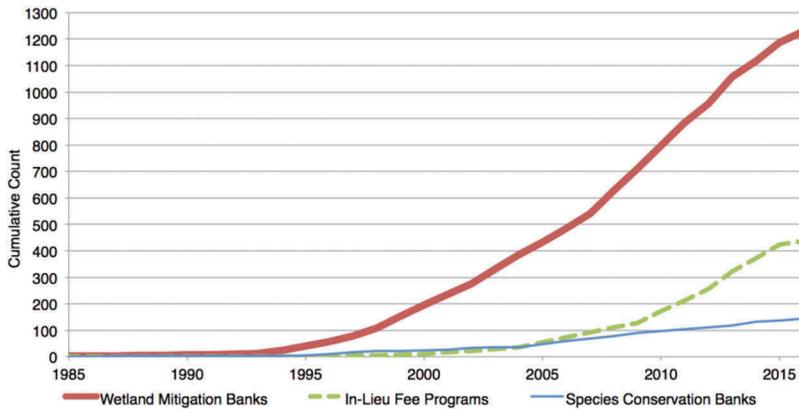


Figure 1. Cumulative counts of wetland mitigation banks, species conservation banks, and in-lieu fee programs, 1985–2016. Source: Army Corps of Engineers Regulatory In-lieu fee and Bank Information Tracking System (RIBITS). Compiled by the author.

operated on a for-profit basis (Environmental Law Institute 1994) – to well over 1200 in 2016. Highly analogous ‘in-lieu-fee programs’ have also grown in prominence; these are market-oriented organizations where public agencies and non-profits (instead of for-profit entrepreneurs) accept cash payments from land developers ‘in-lieu of the developer’s purchasing or creating real, material ecological offsets, with the legal understanding that the collected funds will subsequently be used for nature protection and ecological restoration.’¹ For reasons discussed below, species conservation banks have expanded more slowly (Rea 2017), but their numbers have climbed steadily from none in early 1994 to nearly 150 in 2016. The net volume of the ‘mitigation market’ is difficult to estimate, but likely runs in the range of one-to-ten billion dollars annually (Ecosystem Marketplace 2011). Across the United States, approximately one million acres of wetlands and endangered species habitat, equivalent to roughly 1% of all of the wetlands in the coterminous United States, are now protected in wetland mitigation banks, in-lieu fee programs, and species conservation banks.²

MBIs as markets, for critics and proponents alike

Since their development, both critiques and defenses of species and especially wetland mitigation banks have focused mostly on their market-like features. The ecological critique, for instance, has centered around the ways that the exchange-based concept of ‘offsetting’ is itself flawed, drawing on evidence that shows that compensatory mitigation as a whole – most often not in wetland banks but in the form of so-called ‘on-site mitigation’³ –

generally performs poorly relative to ecological reference sites (Brown and Veneman 2001, National Research Council 2001, Turner *et al.* 2001, Ambrose *et al.* 2007, Tischew *et al.* 2010). Advocates counter that the relatively large spatial scales of wetland and species conservation banks attenuate these concerns, since physically larger restoration areas generally provide better and more enduring ecological functions than small-scale, one-off offsetting sites (Environmental Law Institute 1994, Carroll *et al.* 2009, Moreno-Mateos *et al.* 2012). Further, advocates contend, these MBIs create economic incentives to restore ecosystems and minimize environmental harm – incentives that did not exist prior to the development of these institutions (Carroll *et al.* 2009, Ecosystem Marketplace 2011).

Social scientific assessments of ecological offsetting and MBIs more generally mostly sustain this focus on the economic and loosely ‘market’ features of these policy instruments. Critical scholars explain the proliferation of ecological offsetting and other MBIs by: documenting the affinity of these institutions with neoliberal ideology and market-oriented policy (Robertson 2006, Lave 2012, Stuart *et al.* 2017); highlighting the deregulatory and re-regulatory work that building markets in ‘neoliberal nature’ entails (Castree 2008, Bakker 2010); linking these policy shifts to logics of accumulation in capitalism (Smith 2007, Foster *et al.* 2009, Büscher *et al.* 2012, Moore 2015); showing how nature may be both enrolled into production processes and made to ‘work’ in service of generating new forms of wealth (Boyd *et al.* 2001, Carton and Andersson 2017); and warning of the ways that, by making nature protection profitable and thereby at least partly aligning the interests of capitalists with environmental groups, MBIs may dissipate oppositional politics aimed at creating more robust or even radical ecological reforms (Carton 2014, Felli 2015, Dempsey and Suarez 2016). Social scientific proponents of MBIs, by contrast, remain optimistic that regulators and policymakers can sufficiently control profit motives and refine ecological restoration processes such that MBIs might help truly ‘green’ capitalism (Mol and Spaargaren 2000, Mol 2012). At the very least, these scholars tend to argue, assigning pecuniary value to nature (or to environmental externalities) might help make environmental quality more legible to capitalists, states, and publics alike. Costanza (2003) argues that ‘society can make better choices about ecosystems if the valuation issue is made as explicit as possible’ (p. 23).

Finally, more agnostic analysts, who typically shy away from such explicit endorsements or condemnations of MBIs, have also remained largely focused on the loosely ‘market’ features of these institutions, including documenting the role of the state in constructing MBIs (Lederer 2012, Pirard 2012, Jordan *et al.* 2013, Vaissière and Levrel 2015, Meckling and Jenner 2016). Such accounts, for example, focus on: the diversity of market-like (or more generally economic) mechanisms used to shape policy (Engel

et al. 2008, Pirard 2012); the nationally and otherwise context-specific political and institutional features that shape how market-like institutions are built in different times and places (Jordan *et al.* 2003, 2013, Meckling and Jenner 2016); and even the intricate administrative and technical work required to build markets in ecological commodities in the first place, which, again, often depends heavily on state intervention (MacKenzie 2009, Vaissière and Levrel 2015). Social scientific accounts of MBIs, in short, tend to focus on the complex and contested ways that these policy instruments are ‘re-regulated’ into existence in different contexts, and in relation to broader neoliberal shifts in policy and ideology.

From re-regulation to expanding infrastructural power: the other half of the story

Scholars have focused less on how these processes of re-regulation fit into larger patterns of regulatory change as a whole. Outside processes of re-regulation and market-building, MBIs have developed at a historical moment when, *contra* much of the public and even academic discourse, administrative and state regulatory control over many domains of life has substantially *expanded* (Vogel 1996, Levi-Faur 2010) – and not only in ways that are directly linked to states fabricating new markets. This trend of regulatory expansion is so decisive, in fact, that some scholars suggest that we may be moving into a new age of ‘regulatory capitalism,’ complete with different patterns of politics and the increasing ‘delegation’ of governing responsibility from elected officials to career ‘regulocrats’ in the bureaucracy (Levi-Faur 2005, Morgan and Campbell 2011). Even the growth of private and nonstate regulation, including the explosion of corporate social responsibility regimes and voluntary instruments sometimes classified as MBIs (e.g. voluntary carbon offset markets; sustainable forestry certification schemes), seems to be more about reorganizing regulatory relationships between states and markets than about replacing the former with the latter (Jordan *et al.* 2003, 2013, Schneiberg and Bartley 2008). In some cases these private regulatory regimes may even begin to transition into state control (Bartley 2014).

The key insight here is that beyond depending on ‘the reorganization of public control over private sector behavior’ (Vogel 1996, p. 3), especially in market-oriented ways – that is, beyond re-regulation – MBIs may also be substantially founded upon these larger-scale expansions of state control over social and environmental activity. The simplest indication of such a link is the mandatory character of many of the markets that MBIs create. Unlike markets in land, labor and money, upon which modern human existence depends (Polanyi 2001), or markets in art-topped lattes, sneakers, and pickup trucks, which depend upon culturally conditioned needs,

desires, and status hierarchies (Veblen 2009), markets in things such as carbon or ecological offset credits only exist because of mandates to purchase these rather unusual commodities (Lederer 2012, Vaissière and Levelrel 2015). The ability of the state to compel private actors to purchase entitlements for performing actions that until very recently they had been able to perform at will and at no cost (e.g. emitting carbon dioxide, harming a wetland) is suggestive of something other than just ‘reorganizing’ regulatory control in novel and market-oriented ways. It is suggestive of expanding and more intrusive state control over private economic and ecological activity as a whole.

This kind of thickening state control amounts to the expansion of what political sociologist Michael Mann (1993) long ago labeled ‘infrastructural power,’ which he defines as “‘power through’ society, coordinating social life through state infrastructures’ in ways that ‘penetrate [the state’s] territories and logistically implement decisions’ made by ruling parties and administrators (p. 59).⁴ Infrastructural power, in short, is a matter of coordinating and logistically controlling social – and ecological – action within a given territory: in environmental contexts, it is the manifestation of state-centered and bureaucratic control over the pollutants that industrial facilities emit, when and how land developers construct new infrastructure, what ecological protections builders and industrialists must take, and so on.

Of course, reformers can reorganize or re-regulate any given crystallization of infrastructural power in a given time and place: they can change the ways that economic and environmental activity is controlled, including in ways that support building new markets. The proliferation of MBIs is directly linked to such re-regulatory changes. My argument, however, is that the emergence of these new policy instruments is also predicated on the expansion of infrastructural power per se: the emergence of MBIs is often associated with ‘thicker’ and more ‘penetrating’ state control over economic and environmental life than existed in the recent past, beyond reorganizations and re-regulations of extant rules and patterns of practice. To make this point empirically, I turn to a brief historical exposition of the expansions of infrastructural power that have supported the emergence of species conservation banking and wetland mitigation banking, the two exemplar MBIs I introduced earlier.

Example 1: endangered species regulation

The ability of the state to mandate the purchase of species offset credits rests first and foremost on thick and ‘penetrating’ state control over land development and species protection. Without a well-developed system of

ecological surveillance and a set of social institutions to enforce offsetting requirements, a market in species credits cannot exist.

It is not surprising, then, that species conservation banking in the United States only seems to have developed exactly where regulatory control over land development and endangered species protection has expanded since the early 1990s. As Rea (2017) shows, in most U.S. states through the 1990s and 2000s, the federal Endangered Species Act was interpreted in ways that hemmed in the authority of government biologists, only allowing them to force land developers to ‘minimize’ ecological harm, but preventing regulators from imposing additional ‘offsetting’ requirements (*ibid.*: p. 35–6). Nevertheless, in one state – California – pressure from environmental groups and a suite of supportive state laws created a context where U.S. Fish and Wildlife Service biologists were able to expand their authority under the ESA such that they *could* impose offsetting requirements (*ibid.*: p. 44). A suite of parallel research reiterates the same point in the context of other exchange-based MBIs, such as cap-and-trade schemes: these new markets were only able to develop where states enforced new and more restrictive limits on carbon pollution (e.g. Bailey *et al.* 2011, Lederer 2012, Carton 2014).

Of course, to the extent that the shift toward enforcing endangered species offsets in California facilitated the ‘privatization and marketization of ever-wider spheres of social and environmental life,’ via the development of a market in species credits, one could simply classify this regulatory change as ‘re-regulation.’ But such a coarse categorization does not fully capture the expansion of newly intrusive legal authority that allowed California-based environmental regulators to force land developers to ‘offset’ for impacts to endangered species. Quite simply, the development of species conservation banking in California depended not just on official recognition of a new form of private property called a ‘species credits,’ but also relied on a significant thickening of state control over land development in ways that exceeded enforcement of the same federal law – the Endangered Species Act – in other states.

These expansions of infrastructural power are also visible in national-level data related to the ESA.⁵ Annual consultations under that law – once again, government reviews of land development plans that may impact endangered species habitat – have more than tripled in the last several decades, growing from less than 3000 consultations annually in the late 1980s to between 9000 and 10,000 or more annual consultations in the 2010s (Figure 2). Part of this growth stems from a near doubling in the number of officially listed animal species over that time (itself a manifestation of expanding state control over ecology). Even given this, however, the per-species ESA consultation rate has also roughly doubled: in the late 1980s and early 1990s there were between 13 and 17 consultations per

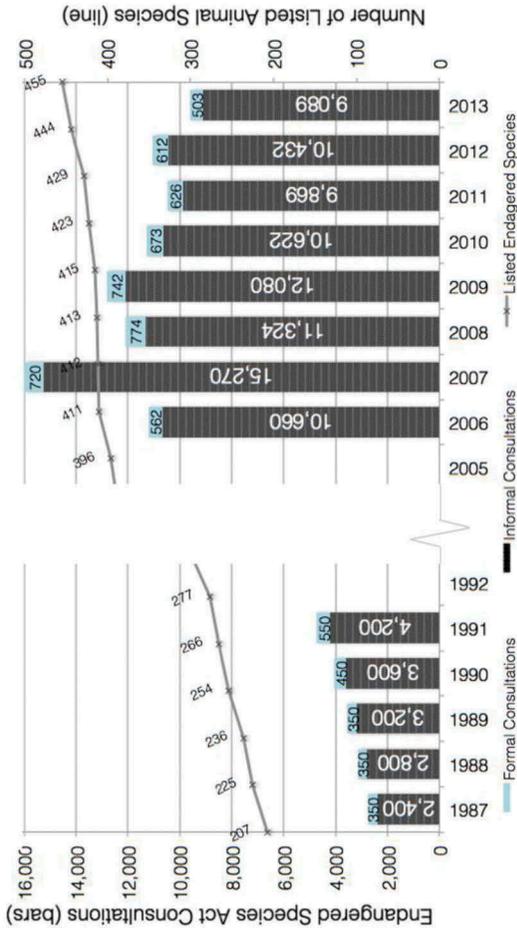


Figure 2. Consultations under the Endangered Species Act 1987–1991; 2006–2013. Source: U.S. Fish and Wildlife Service. Compiled by the author.

listed species per year, while between 2006 and 2013 the rate jumped to between 21 and 38 consultations per listed species per year.

To be clear, increases in endangered species listings and ESA consultations in and of themselves do not mean that the state was more thoroughly or more robustly enforcing environmental law ‘on the ground.’ This is difficult to know. The upward trend in [Figure 2](#), however, does provide compelling evidence that the state’s ‘power over’ and ‘penetration through’ its territory has generally and consistently grown over the last three decades, at least in relation to species protection. A consultation under the ESA, after all, represents a concrete instance of a government biologist reviewing a real construction plan proposed in a specific physical place, and then making a recommendation as to the potential ecological impacts of the proposed project. Even if the consulting government biologist elects to allow the project to proceed unchanged, in engaging in the consultation process at all, the state has inserted itself into economic and ecological activity in a way that it simply did not do before. One can hardly identify a clearer, more concrete example of the state’s power to ‘penetrate its territories and logistically implement decisions.’ This growth of infrastructural power is directly linked to the development of species conservation banking itself: only by more regularly and thoroughly reviewing construction plans can the state also more regularly impose the offsetting requirements that undergird the market in species credits.

Example 2: wetlands regulation

Regulatory shifts that supported the development of wetland mitigation banking illustrate a similar pattern of expanding infrastructural power. Section 404 of the Clean Water Act authorizes state control over land development and pollution that impacts ‘*the navigable waters*’ of the *United States* (WOTUS); the scope of federal governmental authority therefore turns on the definition that legal term. Tracing out the contentious evolution of the definition of WOTUS thus offers a way to identify how infrastructural power has shifted – and generally expanded – from 1972 to present, providing the regulatory foundation for wetland mitigation banking to be built upon. [Figure 3](#) documents these regulatory shifts in detail. An appendix provides a full timeline of these changes (available in an online supplement).

In its first attempt to implement the CWA, in regulations issued in 1973, the Army Corps of Engineers stuck to a traditional definition of WOTUS as ‘those waters of the United States which are presently, or have been in the past... susceptible for use for the purpose of interstate or foreign commerce’ ([Figure 3, C](#); see [Federal Register 1973](#)). This official rule mentioned the importance of wetlands, but did not explicitly define them in relation to

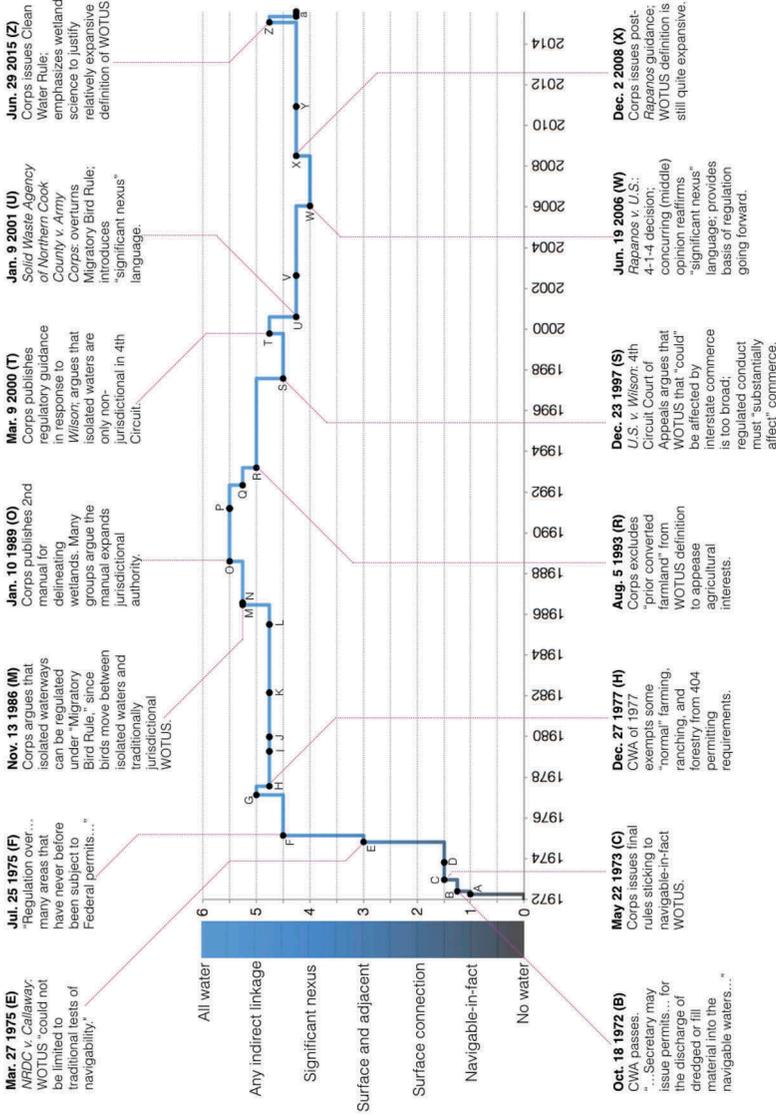


Figure 3. Authority of U.S. Government (U.S. Army Corps of Engineers) to regulate 'Waters of the United States' (WOTUS) under the Clean Water Act, 1972–2016. Based largely on Mulligan (2016). Visualized by the author. Full table of listed events provided in Appendix, available online.

‘navigable waters’ and gave the Corps authority to allow harm to wetlands if the ‘benefits of the proposed alteration outweigh the damage to the wetlands’ (Federal Register 1973, 12220). The rule did not mention tributaries or other indirect connections to ‘navigable waters’ whatsoever.

Any MBI such as wetland mitigation banking would struggle to exist in a regulatory regime like this one. Consistent legally induced demand for something like wetland offset credits cannot exist where the legality of state control over wetlands is ambiguous at best, and where requirements for wetland offsets could be undercut at any time by the whims of a Corps engineer who argued that the destruction wetlands was permissible because of the ‘benefits’ the proposed building project would bring.

In 1975, however, the federal government’s authority to regulate wetlands began a decades-long ascendance. In *National Resources Defense Council v. Callaway* (Figure 3, E) the U.S. District Court for the District of Columbia struck down the Corps’ initial definition of WOTUS and argued that, based on clear statutory intent by Congress, the definition of WOTUS could not be limited to ‘traditional tests of navigability.’ The court demanded new regulations with a broader definition.

In its next regulatory iteration, consequently, the Corps adopted a substantially more expansive definition of WOTUS, asserting control not only over all traditionally navigable waters, but also over ‘all tributaries (primary, secondary, tertiary, etc.)’ of these waters, and further, ‘waters located entirely within one state’ but somehow connected to interstate commerce (e.g. used in interstate tourism, agriculture, and so on; Figure 3, F; see Federal Register 1975). A more permanent final rule issued two years later, in 1977 (Figure 3, G) went even further, directly asserting control over ‘isolated lakes and wetlands, intermittent streams, prairie potholes, and other waters... the destruction of which *could* affect interstate commerce’ (my emphasis; see Federal Register 1977). Eight years later, in 1985, the Supreme Court in *United States v. Riverside Bayview Homes* affirmed the Corps’ authority to regulate wetlands merely *linked* to navigable waters, despite the fact that such wetlands were clearly not themselves ‘navigable’ in any meaningful sense of the term (Figure 3, L). In November of 1986, the Corps expanded its authority even further, arguing that it had authority to regulate isolated waters *not hydrologically connected to navigable waters at all*, on the grounds that these bodies of water are used by migratory birds that, through their migrations, connect these isolated waters to other waterways that *are* linked to navigable WOTUS (Figure 3, M).

This legal-ecological (and avian) argument effectively represented the apex of the federal government’s authority over waterways and wetlands in the United States (Figure 3, M–O) – exactly at the time when the first proto-wetland mitigation banks were beginning to emerge in the late 1980s and early 1990s. A handful of cases and legislative efforts chipped away at

this expansive authority over the course of the 1990s (Figure 3, Q–S), but the Corps’ expansive control over wetlands and its migratory bird justification remained largely intact until 2001, when, in *Solid Waste Agency of Northern Cook County (SWANCC) v. Army Corps of Engineers*, the Supreme Court ruled that the migratory bird argument took the commerce clause and thus regulatory authority too far (Figure 3, U). Still, the SWANCC ruling was relatively narrow and retained the Corps’ authority to regulate waters with a ‘significant nexus between. . . wetlands and “navigable waters.”’ That ‘significant nexus’ test – and its related and relatively expansive definition of WOTUS – remains in effect today, even after the ambiguous 4–1–4 *Rapanos v. United States* Supreme Court decision in 2006 (Figure 3, W), and despite both the Obama administration’s attempt to expand the definition further (Figure 3, Z), and the Trump administration’s thus far unsuccessful attempts to scale it back (Figure 3, a).

The important point is that, in disputing and recrafting the definition of WOTUS over the past four decades, government regulators and their critics were quite literally debating the extent to which the state can and should ‘penetrate its territories and logistically implement decisions,’ in this case as they relate to human interventions into the thick black mud, reedy grasses, and ephemeral streams that make up wetlands and other ‘waters of the United States.’ This expanding infrastructural power provided the formal-legal foundation that made the development of an MBI such as wetland mitigation banking possible. After all, one can only profit from selling wetland credits where government regulators require land developers to offset the harm they cause to these ecosystems. Within the confines of the Clean Water Act, in turn, it is only possible for regulators to impose these offsetting requirements where environmental bureaucrats are able to stretch the legal concept of ‘navigable waters’ to include a large fraction of wetlands themselves, which are not ‘navigable’ at all. Nonetheless, by drawing on intricate social-ecological linkages, like the flight and resting patterns of migratory birds that indirectly connected isolated waterways and truly navigable ones, bureaucrats who enforced the Clean Water Act were able to expand their regulatory authority. The generally expanding definition of WOTUS represented a substantial thickening of infrastructural power that directly undergirded the birth and development of market-oriented wetland mitigation banking. Were regulatory control over WOTUS to return to pre-1975 levels, the market in wetland offsets credits would be immediately undercut.

The authoritative foundations of MBIs

Social scientists have extensively documented the ‘market’ features of MBIs. Researchers have detailed: the troubling ways that integrating market logics

into environmental policy may result in ecologically dubious but profitable forms of nature protection (Büscher *et al.* 2012, Lave 2012, Robertson 2012); the ways that market-oriented policy approaches may depoliticize environmental protection (Carton 2014, Felli 2015, Dempsey and Suarez 2016); and, more optimistically, the ways that building MBIs may introduce incentives and flexibility into environmental regulation in ways that might encourage innovations and higher levels of environmental quality (Costanza 2003, Tietenberg 2006, Engel *et al.* 2008, Mol 2012). Scholars have also documented the state-driven construction of property rights, governance structures, and monitoring technologies that support markets in nature (Bäckstrand and Lövbrand 2006, Castree 2008, MacKenzie 2009, Lederer 2012, Jordan *et al.* 2013, Vaissière and Levrel 2015).

Researchers have directed less attention toward the substantial thickening of state infrastructural power that also undergirds the growth of MBIs. As the regulatory shifts surrounding the development of species conservation banking and wetland mitigation banking illustrate, the development of new MBIs often hangs together with considerable and clearly observable expansions of the state's authority to regulate and control human relationships with nature. It is important to be clear about causality here: the claim is not that expansions of environmentally focused infrastructural power *cause* the development of MBIs. One can certainly imagine different historical and ideological contexts where the thickening of regulatory power leads to other, non-market regulatory innovations. Nonetheless, these expansions of environmentally focused infrastructural power *do* seem to be requisite for the emergence of MBIs: this regulatory thickening provides the foundation for building new markets. Processes of re-regulation unfold 'on top of' processes of regulatory thickening.

The scope and implications of this argument warrant careful consideration and further investigation. I began this discussion with a puzzle: why, if MBIs are so 'market like' and consonant with capitalism, have pro-market political constituencies, such as the Republican Party in the United States, grown increasingly hostile to them? Observing the linkages between MBIs and expansions of infrastructural power is suggestive: not only might conservative and libertarian-leaning constituencies object to more narrowly defined re-regulatory interventions required to build new markets (Bohr 2016), but they might also object to the more direct expansions of infrastructural power that MBIs are built upon, and that likely represent much more significant expansions – and not just reorganizations – of state authority.

More robustly substantiating this argument requires considerable further work. First, my examples and analysis are focused on just one country: the United States. It could be that growing conservative opposition to MBIs in the United States is related to a resurgence of specifically American (or at

least Anglo-liberal) economic ideology, which seems to be especially heavily influenced by individualist and libertarian political philosophies with strong commitments to ideas of ‘unregulated,’ ‘natural’ markets (Foucault 2008, Mann 2013, Bohr 2016). In other polities, by contrast, such as Germany or Japan, where policymakers and scholars are more likely to embrace ‘ordo-liberal’ economic ideologies and explicit state management of the economy (Streeck and Yamamura 2001, Bonefeld 2012), MBIs might encounter less conservative backlash. In short, how the politics of MBIs – and regulatory thickening more generally – varies across national and sub-national jurisdictions remains an open question.

Second, my analysis is focused on species and wetland banking, but MBIs are a diverse set of regulatory instruments (see, e.g. Jordan *et al.* 2003, 2013, Héritier and Rhodes 2011). Private and voluntary forms of regulation seem to work in fundamentally different ways – and to grow out of fundamentally different political-institutional compromises – than ‘command-and-commodify’ institutions like species conservation banking or cap-and-trade – even if scholars generally think of all these instruments as MBIs (Rea 2017). The point is simply that how expansions of infrastructural power do – or do not – undergird the growth of different *kinds* of MBIs demands further empirical inquiry.

Third, it is not simple to disentangle political opposition to expanding infrastructural power from opposition to re-regulation and market-building. Yet sorting out how and why factions resist (or embrace) expansions of infrastructural power per se (a ‘true’ *expansion* of state control; see, e.g. Hochschild 2016, pp. 277–279) versus re-regulation (a *reorganization* of state control, typically in market-oriented ways; see, e.g. Vogel 1996, Polanyi 2001) may have important implications for explaining both the political opposition to and the welcoming of MBIs across political constituencies.

Whatever the other limitations of this study, I have demonstrated that species and wetland banking – clear examples of MBIs – are built atop substantial historical expansions of infrastructural power and ‘regulatory thickening’ that go well beyond much more widely discussed processes of re-regulation. This link between MBIs and infrastructural power calls into question the degree to which MBIs can be usefully theorized as instances of (neo)liberalization at all (Vaissière and Levrel 2015). Perhaps more interestingly, it also points to the ways that building MBIs may create opportunities for environmental advocates to use ‘market’ framings to subversively expand public – and not just private – control over environmental quality. The well-documented flaws and perverse incentives that can grow out of MBIs are worth taking seriously. Even so, conservative opponents of these institutions may be onto something: beneath their market veneer, MBIs would seem to create – indeed, to depend upon – new and intricate systems of public control over environmental quality.

Notes

1. Not surprisingly, in-lieu fee programs have suffered from substantial problems related to the loss or disappearance of funds, or the implementation of questionable restoration work (Gardner 2011). These problems are at least partly addressed by strengthened requirements set out in 2008 regulatory reforms (see Federal Register (2008)).
2. As of 17 October 2016, the Army Corps of Engineers Regulatory In-lieu fee and Bank Information Tracking System (RIBITS) reported 1.02 million acres of land protected in wetland mitigation banks, in-lieu fee programs, and similar off-site offset sites. Total wetland area of the coterminous United States is estimated at 110.1 million acres (Dahl 2011, p. 16).
3. 'On-site' offsets are located at the same location as a building project. Few studies evaluate the ecological effectiveness of mitigation in wetland 'banks' per se, which are larger 'off-site' restoration sites geographically separated from construction projects. For partial exceptions, see Ambrose *et al.* (2007) and Robertson and Hayden (2008).
4. For a recent review and interrogation of Mann's concept, see Tarrow (2018).
5. Unfortunately, state-by-state breakdowns of the following data are not available.

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Appendix

Event	Date	Description	Notes
A	Sep. 9 1972	Early Definition of 'Navigable Waters of the United States'	Regulation is a mere four pages long. Does note that 'Marshlands and similar areas are thus considered "navigable" in law' (37 Fed. Reg. 18,291).
B	Oct. 18 1972	Clean Water Act of 1972 passes	Authorizes the Secretary of the Army to 'issue permits... for the discharge of dredged or fill material into the navigable waters' of the United States.
C	May 22 1973	Final Rule defining WOTUS	Corps essentially sticks to navigable-in-fact WOTUS, i.e. waters used for actual commerce by boat (38 Fed. Reg., p. 12,217).
D	Apr. 1 1974	Corps issues initial formal definition of WOTUS under CWA	Corps defers to Sep. 9 1972 definition of WOTUS (see A above) while noting that even this narrow interpretation of WOTUS 'asserts authority over many heretofore unregulated waterways' (39 Fed. Reg., p. 12,115).
E	Mar. 27 1975	NRDC v. Callaway	U.S. District Court for the District of Columbia rules that WOTUS 'could not be limited to traditional tests of navigability.'
F	Jul. 25 1975	Corps issues interim rule in response to Callaway	'Regulation over... many areas that have never before been subject to Federal permits...' (40 Fed. Reg. p. 31,320).
G	Jul. 19 1977	Corps issues final rule in response to Callaway	Most expansive definition of WOTUS yet, including 'isolated lakes and wetlands, intermittent streams, prairie potholes, and other waters ... the destruction of which could affect interstate commerce' (42 Fed. Reg., p. 37,127; emphasis added).
H	Dec. 27 1977	Clean Water Act of 1977	Attempts to narrow definition of WOTUS in House are dropped in conference committee. Final bill does exempt some 'normal' farming, ranching, and forestry activities from 404 permitting requirements.
I	Sep. 5 1979	Attorney General asserts that EPA has final authority in determining WOTUS	Locates more authority in explicitly environmental agency. Corps and EPA struggle over power sharing in years to come (43 Op. Atty Gen. 197).
J	May 19 1980	EPA publishes its rule of WOTUS	Reasserts that "'Waters of the United States'... covers much more than waters which are traditionally navigable' (45 Fed. Reg., p. 33,290).
K	Jul. 22 1982	Corps issues interim final rule adopting EPA's WOTUS definition	No significant shift in power to regulate WOTUS (47 Fed. Reg., p. 31,794).
L	Dec. 4 1985	U.S. v. Riverside Bayview Homes	Upholds Corps authority to regulate wetlands as part of WOTUS on the grounds that wetlands, while not navigable, are connected to navigable WOTUS.

(Continued)



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Event	Date	Description	Notes
M	Nov. 13 1986	Corps issues guidance in relation to 'Migratory Bird Rule'	Corps argues that isolated waterways can be regulated under CWA since birds move between isolated waters and traditionally jurisdictional WOTUS (51 Fed. Reg., p. 41,206).
N	Jan. 1 1987	Corps publishes first wetland delineation manual	Essentially a technology for making nature (wetlands) 'legible' and thus 'regulatable,' thereby slightly expanding regulatory authority.
O	Jan. 10 1989	Corps publishes 2nd manual for delineating wetlands	Many groups argue the manual expands jurisdictional authority; significant resistance to this change (Mulligan 2016).
P	Aug. 14 1991	Interagency revisions to 1989 wetlands manual	In defining wetlands more rigorously, revisions narrow Corps authority somewhat.
Q	Aug. 17 1991	Congress prohibits the Corps from using 1989 manual	As a strategy for restricting regulatory power, Congress does not allow Corps to use public funds to pay for delineating wetlands using the more expansive definition of WOTUS implied by the 1989 manual (see O above).
R	Aug. 5 1993	Corps excludes 'prior converted farmland' from WOTUS	Concession to appease agricultural interests (58 Fed. Reg., p. 45,008).
S	Dec. 23 1997	U.S. v. Wilson	4th Circuit Court of Appeals argues that WOTUS that 'could' be affected by interstate commerce is too broad (see G above); court argues that regulated conduct must 'substantially affect' commerce.
T	Mar. 9 2000	Corps publishes regulatory guidance in response to Wilson	Corps resists Wilson: argues that isolated waters are only non-jurisdictional in 4th Circuit. In all other geographic regions, more expansive definition of WOTUS remains intact (65 Fed. Reg., p. 12,818).
U	Jan. 9 2001	Solid Waste Agency of Northern Cook County (SWANCC) v. Army Corps	Overtakes Migratory Bird Rule; introduces 'significant nexus' language granting Corps jurisdiction over waters with a 'significant nexus' with navigable-in-fact waters.
V	Jan. 15 2003	Corps issues an Advance Notice of Proposed Rulemaking to develop regulations in response to SWANCC	Rulemaking effort later abandoned (68 Fed. Reg., p. 1991).
W	Jun. 19 2006	Rapanos v. U.S.	4-1-4 decision; concurring (middle) opinion reaffirms 'significant nexus' language of SWANCC; provides basis of regulation going forward.
X	Dec. 12 2008	Corps issues post-Rapanos guidance	WOTUS definition is still quite expansive.
Y	May 2 2011	Corps proposes expansion of definition of WOTUS	Rule change eventually abandoned (76 Fed. Reg., p. 24,479).

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Event	Date	Description	Notes
Z	Jun. 29 2015	Corps issues Clean Water Rule (CWR)	Emphasizes wetland science to justify relatively expansive definition of WOTUS (although Corps insists that it is only regulating what it is already statutorily required to regulate; see 80 Fed. Reg., p. 37,053). Strong conservative political opposition erupts.
a	Oct. 9 2015	U.S. Court of Appeals for the Sixth Circuit stays implementation of Clean Water Rule	Two months later, in December of 2015, presidential candidate Donald Trump promises to rescind CWR. In July of 2016, House prohibits use of funds for delineating WOTUS beyond what were considered jurisdictional in 2012. In May of 2017, now president Trump orders EPA to review CWR, and in January 2018 the Trump administration formally stops the implementation of the CWR, which had never gone into effect. A new rule-making process is currently underway. Legal battles over the CWR and the Trump Administration's replacement for it, already ongoing, will continue, and will likely land at the Supreme Court for yet another decision on WOTUS.