...I want to ask you today what the generations to follow will say of us 40 years from now. It could be they’ll report the loss of many million acres more, the extinction of species, the disappearance of wilderness and wildlife; or they could report something else. They could report that sometime around 1989 things began to change and that we began to hold on to our parks and refuges and that we protected our species and that in that year the seeds of a new policy about our valuable wetlands were sown, a policy summed up in three simple words: “No net loss.”

— President George Bush, speaking to Ducks Unlimited, June 8, 1989 (USGPO, 1990:694)

Woodbury, Minnesota, is the fastest-growing suburb in the Minneapolis-St. Paul metropolitan area. Because of its location on poorly-drained glacial till, it is blessed with a multitude of wetland basins, which must be filled to accommodate a spreading tangle of subdivisions and malls. Consider the objections of new residents Cheryl and Jerome Brunner to this plan: “We noticed this property in full view from the back of our house to be full of nature with ponds and trees....If a builder comes in and builds house after house, yes Woodbury will become just another...suburban effect. ...The Woodbury City Council must have respect for nature, wetlands, such as this section” (Brunner, 1992). The wetland on the property was filled. Fortunately for the Brunners, a replacement wetland of greater size was built on the same property, a practice mandated by the
Minnesota Wetland Conservation Act of 1991. The old wetland was shallow, grassy, and seasonal; the new wetland is permanently inundated and deep, has steep sides, and has only a sparse vegetational community at the margins. Looking like a miniature reservoir, with the skeletons of flooded trees scattered throughout, it bears almost no resemblance to the old wetland, but serves admirably as a storage basin to keep stormwater out of the neighborhood’s basements. It features prominently as a “wetland and wildlife reserve” on the development’s brochures, which trumpet the subdivision’s environmental amenities.

Since the late 1980s these replacement wetlands, or mitigations, have become a standard feature of most development activities that involve wetland destruction. Thousands of acres of new wetlands are now created yearly across the United States in order to recover the lost amenities of destroyed wetlands such as those that concerned the Brunners. Although in the Woodbury case the wetland impact was mitigated “on-site,” in other cases wetland mitigations have been tens to hundreds of miles from the site of impact. Inirty state houses and the US Congress, ecological restoration and mitigation have been offered as the solution to the environmental degradation caused by development, usually under the rubric of Bush’s promise of “no net loss of wetlands.” However, as the vignette above demonstrates, the restoration is far from perfect. Although in the 1990s the United States has experienced a dramatic reversal in the postwar trend of rapid wetland loss, through “no net loss” policies such as Minnesota’s, this has hardly resulted in a return to landscapes of preindustrial ecological harmony. Rather, the science of ecological restoration has been busily producing landscapes that are conceived of as movable and consumable commodities, ambiguous admixtures of natural and cultural categories that signify, perhaps, the fragility of both in contemporary capitalist society. It is the interpretation of these landscapes to which I devote this paper.

Ecological restoration1 is finding its way timidly into the literature on political ecology and the cultural construction of nature. In describing the mutual constitution of materiality and representation, authors such as Castree (1995), Haraway (1997), Demeritt (1998), and Swyngedouw (1999) have called attention to the ways in which, “[i]n a world where the artefactual and the natural have been imploded, nature itself . . . has been patently reconstructed” (Haraway, 1997:245). These analyses, which bring a poststructural understanding to the traditional Marxian concerns of class, capital and commodification, have paid a great deal of attention to the ways that capitalism’s impacts on nature—what Neil Smith (1990:97) has called the inscription of capital upon the landscape—are mediated by an array of representational practices, including narratives of science and commodification. It seems odd, in light of these developments, that ecological restoration—surely “constructed nature” in its most literal and pedestrian sense!—has merited only passing attention from critical
theorists: Andrew Light and Eric Higgs (Light, 1994; Light and Higgs, 1996; Higgs, 1997) have made the most concerted attempt to grapple with the subject, while Cindi Katz (1998) lays out some intriguing lines of inquiry.

Since George Bush’s 1988 presidential campaign made “no net loss of wetlands” (NNL) a household phrase, the meaning of the word “wetland” has been intensively debated and reworked, with the result that wetlands and wetland functions (e.g., floodwater storage) are now commonly represented as commodities as they are destroyed and restored. As a case study in the simultaneous discursive and material transformation of landscapes under late capitalism, NNL seems to offer a textbook study of how nature becomes a commodity through the emergence of what Martin O’Connor calls “capitalist nature”: “... the representation of the biophysical milieu (nature)... as reservoirs of ‘capital,’ and the codification of these stocks as property tradable ‘in the marketplace’—saleable at a price that signifies the value (utility) of the goods and services flows as inputs to commodity production and in consumption” (1994:126; emphasis in original).

In accounts of capitalist nature (as exemplified by J. O’Connor, 1994), capital forces are hegemonic, and precious little space for conceptions of resistance is provided. Thus, alongside this understanding, it is important to remember Noel Castree’s observation that Marxist accounts of constructed nature “tend... to exaggerate the transformative powers of capitalism” over its material context (1995:20). To the account of capitalist nature, I would add insights discussed above on the cultural mediation of these forces, as well as recent insights from the subdiscipline of political ecology (Bunker, 1992; Zimmerer and Young, 1998; Turner, 1999) which attempt to combine a poststructural approach to nature with ecologically sophisticated understandings of landscapes, seeing environments as “parts of a highly differentiated natural world made up of beings, matter, and processes whose existence is at least partly independent of our own” (Zimmerer & Young, 1998:21). Bringing these three lines of thought together on the fertile subject of restoration ecology, I seek to add cultural and ecological depth to our understanding of the process by which nature is commodified.

Following the controversy over NNL teaches us two things about the concept of capitalist nature that I wish to focus on here. First, the new “wetland” object produced by NNL discourses does not become a commodity by fiat, simply by virtue of its existence within an overwhelmingly capitalist society. It passes through many hands; it becomes embroiled in institutional conflicts at many scales, is opposed by practices flowing from earlier “wetland” representations, and must be supported by a constellation of consumers desiring specific functions in specific places. The concept that money and commodification provide “common material languages” (Harvey, 1990:102), abstracting the particularities of the laborer into
labor-value and the commodity into exchange-value, has a long Marxist heritage. Through commodification, “abstraction is made from all the concrete forms and useful properties of actual work,” and all material manifestations of labor are reduced to “their common character of being human labour in general, of being the expenditure of human labour power” (Marx, 1976:159). James O’Connor’s (1998) work on the “second contradiction of capitalism” extends this analysis from labor into the realm of nature; however, this valuable approach should never lose sight of the social work involved in abstraction and commodification.

The second lesson to be taken from the NNL debates is that the process of capitalizing nature must play out upon, as well as produce, a diverse ecological landscape. Wetlands exist as embedded features in landscapes, linked by hydrology, animal migration and plant dispersal to areas far beyond the hydric soil boundary. This presents a qualitatively different element of nature for capitalization than, say, grain or genes. Wetlands differ greatly around the United States in their ecological character, and the services being commodified differ in their reliance on forces outside the wetland basin itself. Stormwater storage is easily created by elevating a basin’s sides but still requires a watershed, while duck production requires duck participation and position along a continental flyway, among other things. As I will show below, such place-specificity in ecological services creates a signature tension within the process of commodity abstraction. As the work of Castree (1995), Whatmore and Boucher (1993), and Bunker (1992) reminds us, even produced nature has important material/ecological dimensions, which must be understood for broad categories such as “capitalist nature” to carry meaning. As Lele has pointed out, viewing nature only as a condition of production ignores the fixedness of features like wetlands and forests which, unlike capital or labor, can neither move nor shift to new kinds of production to achieve comparative advantage (1991:617).

To observe the shaping of NNL, I will rely primarily on documents associated with debates over the meaning and content of NNL legislation in two venues: the US Congress and the Minnesota State Legislature. Attention to more than one scale of debate allows me to observe how the scale of governance and the ecological scale interact with and constitute each other. The texts produced by these legislative bodies are obviously not entirely satisfactory records of the truly broad-based nature of the debate over wetlands, but a broader survey is beyond this paper. As McCann says, “The institutional sites of the state—the chambers and buildings in which discourses related to landscape are articulated—are vitally important spaces in any process of landscape production. Their symbolism confers legitimacy on certain discourses . . .” (1997:643). The roles of science and the state in fashioning a material/discursive unity called “wetland” suitable for sale runs throughout this paper, though a full explication of these roles would require more lengthy attention than
I can give them here. My method of following legislators and scientists to discover the content of the wetland commodity draws on Latour’s (1987) method of following scientists and technicians to discover the content and fate of scientific knowledge-claims. By understanding how wetland facts are advanced, abandoned or modified as they move through networks of agents far from the restoration site or wetland technician that initiated them, I trace the political economy of the commodity produced without losing sight of the cultural mediation or ecological significance of these claims. Just as Latour demands that we examine the process of determining what counts as nature, I observe, in the NNL debates, the process of defining what counts as “wetland,” by following the statements of legislators, ecologists, developers, and regulators working to produce nature.

To begin, I offer the brief theoretical argument that ecological services may be in the process of being commodified, but it is important to have a clear concept of both the nature and extent of the process in each case. Following that, I use the legislative texts to understand four moments in the commodification process. I conclude the paper with some caveats on the enthusiastic pricing of nature urged by many ecologists, as well as some thoughts on the growing role of restoration science in making the future of nature.

Commodification

A commodity appears at first sight to be an extremely obvious, trivial thing. But its analysis brings out that it is a very strange thing, abounding in metaphysical subtleties and theological niceties.

— Karl Marx (1976:163)

The commodification of nature has been addressed at length by many writers, both within the Marxian tradition and without (Smith, 1990; Cronon, 1991; M. O’Connor, 1994; Light and Higgs, 1996; Harvey, 1996; and Castree and Braun, 1998, to name only a few). The term “commodity,” however, is frequently used without definition, as if reflecting simply that a part of nature has been assigned an economic value through some unproblematic and actorless process. Along with other factors of production, nature has special status as a “fictitious commodity,” an entity that cannot be rendered fully exchangeable because it cannot “be detached from the rest of life, be stored or mobilized” (Polanyi, 1957:72). James O’Connor (1994) writes of the range of regulatory checks that might be necessary to manage these fictitious commodities and protect capitalism from crises precipitating from their rough treatment as real commodities (his “second contradiction of capitalism”). Martin O’Connor sees this regulatory reform in action in the
ways that degraded environments are now represented as “the new commodity to be carved up, managed, bought and sold” of which the “full cost” can never be calculated (1994:142). However, while James O’Connor’s elaboration of “capitalist nature” as a different physical and representational entity under capitalism is important, it is also crucial to identify local and historical obstacles to the way in which “capital remakes nature and its products biologically and physically (and politically and ideologically) in its own image” (1994:158). We may be entering a new world, as he suggests, but it is a world with a differentiated ecological, cultural, and regulatory landscape. It is necessary to ask, then, in what ways can we consider a wetland, more specifically than “nature,” a commodity and the NNL discourse as instrumental in creating it?  

The narrowness of neoclassically inspired views of commodities, which often marginalize the concept into a certain subclass of material goods produced for market exchange, does not help us understand the culturally and ecologically complex process by which nature is represented as a commodity. Latour’s ethnographic method of following the discursive strategies by which something is/is not represented as available for exchange will serve us better. Central to Marxist commodity theory is the idea that commodification involves an abstraction from the materiality of the unique object to an exchangeable medium which signifies the object (e.g., labor to labor-power) (Marx, 1976:125; Kopytoff, 1986:81; Harvey, 1990:102; M. O’Connor, 1994:136). This act of reference between materiality and abstraction is worth focusing on with regard to wetlands. “Reference” is here used in Latour’s sense, of maintaining the identity of a thing between distinct representations in scientific (and here economic) description (1999:73). Thus, an electrocardiograph readout can be described unproblematically as “a heartbeat,” and a shaded map unit marked “Type II” can be described as “a wetland.” Commodification involves an act of reference in which, through exchange, the abstraction is treated by actors as equivalent to the concrete, even though the two may differ in many important respects.

The transformation of wetland services into commodities is observable in at least four moments in Harvey’s (1996:55) sense:

1. (scientific) abstraction to functional categories
2. monetary valuation of these categories
3. spatial abstraction of already-abstracted functional categories
4. establishment of the exchange process.

While this is certainly not a universal model of commodification in any sense, I hope it will become apparent that these are four significant moments of commodity production in this case. Cronon’s (1991) description of the emerging wheat market in nineteenth-century Chicago illustrates several moments in this process. Like wetland, grain had already been a commodity for many years before a new negotiation of value
fundamentally transformed both the meaning and materiality of grain. To facilitate the exchange of grain, the Board of Exchange created homogenous categories (such as “#2 Spring Wheat”) so that grain could be represented by receipts. These categories were immediately imbued with monetary value and made available for exchange. The individual grain was irrelevant in the face of grain, the commodity; only the features deemed relevant by the Board were referred onto the abstraction. The legal structures put into place by NNL-inspired legislation served much the same function. Just as Chicago’s grain elevators and futures market “helped turn grain into capital by obscuring and distancing its link with physical nature,” NNL called into play numerous systems of assigning wetlands to homogenous types, of turning wetlands into capital (Cronon, 1991:120). 5

It is particularly important to recognize the material consequences of the difference between functional and spatial abstraction. Smith (1990:74) articulates the relationship between these distinct but intertwined notions: “… [T]he abstraction of space into a concept removed from direct practice is closely connected to the development of commodity exchange. The abstraction from use and from the material aspect of a commodity, which is inherent in the exchange act, provokes the possibility of the abstraction of space from immediate material existence.” This “possibility” has been contingent on the ability of the NNL discourse to represent wetland services as mobile, through restoration/creation activities, from the site of impact to the site of service recovery. Given the landscape embeddedness of wetlands, this was a somewhat more difficult task than that involved in the case of grain, and is an ongoing process. Wetland services began to be identified and abstracted monetarily with the rise of environmental economics in the United States in the 1970s, but this touched on only the first two moments in commodification noted above. NNL has begun the next step: it is now possible to speak of the spatial abstraction and exchange of wetland services through the creation of new wetlands, the use of mitigation banks, and trade in mitigation credits. In what follows, it will be apparent that as wetland commodification has progressed, it has become increasingly dissimilar to the simple capitalist fiat evident in Cronon’s account of grain.

Wetland Histories

Agent Mulder: Are there any swamps around here?
Sheriff: We used to have swamps—till the EPA made us take to callin’ ’em wetlands.

— The X-Files (1998)
NNL arose as a discourse in the mid-1980s, following fifteen years of intense American regulatory attention to wetlands. In this section I will briefly describe the struggle that produced NNL, an institutional and economic struggle over environmental regulations. Recent trends in American environmentalism and policy have been well covered in works by writers such as Andrews (1999), Tokar (1997), and Dowie (1995), and wetland history in America has received particularly careful attention from Vileisis (1997) and Prince (1997). These histories describe the destruction of over half of the wetland acreage in the United States, mostly for agricultural purposes, before the environmental movement began to stimulate debate on alternative valuations of nature.

The term “wetlands” was not a widely used category prior to the 1970s. Wetlands were first mentioned in legislation, and explicitly protected, in the 1977 Clean Water Act (CWA). However, the 1972 Federal Water Pollution Control Act (FWPCA) had been used to prevent the filling of wetlands, under the auspices of protecting “waters of the United States.” Under the FWPCA, the Army Corps of Engineers (COE) was given the authority to issue or deny permits for the filling of waters of the United States, and the Environmental Protection Agency (EPA) was given power of veto over these permits, in what has always been an uneasy partnership. While the COE did not initially interpret the FWPCA as relevant to most wetlands, a 1975 US Supreme Court decision (Natural Resources Defense Council v. Callaway) forced the COE to define wetlands as waters of the United States. Between 1975 and 1985, various federal agencies produced five distinct regulatory definitions of “wetland,” each delineating a different regulated landscape (NRC, 1995:48), although no technical manuals were produced to promote the uniform application of any of these definitions until 1987. This lack of consistency served as an advantage to these multiple agencies attempting to stake out their own institutional turf on the contested ground of wetlands. It was not until NNL advanced the idea of the wetland as a uniform commodity that these institutions adopted broadly consistent definitions and identification methods.

The CWA stated that the mitigation of wetlands was only to be considered as a last resort, after strategies for the avoidance and minimization of impact had been considered. Nonetheless, the mitigation of wetland destruction through wetland creation or restoration became very common during the 1970s. Mitigations became crucial in ameliorating interagency conflict over wetlands regulations. Agencies such as the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service lacked the EPA’s veto authority over the COE’s wetlands fill permits, so rather than deny wetlands development only to be overridden by the COE, they would propose mitigation without consideration of avoidance or impact minimization. An EPA official explained that “as early as 1975 agencies would compromise their positions on a permit as long as there was, at least on
paper, no net loss of wetlands” (Kruczynski, 1990:551). Though the slogan “no net loss” was not invented until 1985, it can be used to describe the informal compromise worked out in the 1970s between institutions, unwilling partners in carrying out the awkward rules generated by the CWA. Struggles between institutional agendas governed the wetlands landscape, largely in the absence of broad narratives about wetlands’ economic value. The EPA was generally reluctant to use its veto power, regional COE staffs had different attitudes toward compliance with CWA regulations, and CWA guidelines “were regularly being ignored in some regions when compensatory mitigation was offered. This was rationalized by concluding that any losses of fish and wildlife habitat and other wetland functions were replaced through attempted wetland creation” (Kruczynski, 1990:551).

Some kind of overhaul of federal wetlands regulations would clearly serve the interests of both land development interests and environmentalists (who were equally unhappy with the confused state of wetland regulation), the question being to whose advantage such an overhaul would operate. In 1987, at the behest of President Reagan’s Council on Competitiveness (an executive branch body with the power to circumvent federal regulations that interfered with free enterprise, headed by Vice President Bush), the EPA convened the National Wetlands Policy Forum (NWPF). This body comprised 64 members representing major stakeholders in the issue of wetlands resources, including developers, small farmers, mainstream environmental groups, and wetlands scientists. To chair the NWPF, the Foundation chose moderate Republican Governor Thomas Kean of New Jersey, the architect of the first “no net loss” legislation in the country, which had been passed in his state in 1986. Jon Goldstein reflects on the unlikely prospect of meaningful consensus in this group:

> As one of the staff to Interior’s representative and an observer of the yearlong deliberations, I thought nothing useful could possibly emerge from the diverse positions and partisan bickering. So much for my predictive powers. The forum produced a consensus report, albeit with largely unrealistic recommendations, a landmark, comprehensive examination of wetland issues, and an appealing slogan, “No Net Loss of Wetlands.” (Goldstein, 1991:2)

It is this last quality that proved most salient. The report might have gone unnoticed had the Bush presidential campaign not needed to shore up a dismal environmental record. Bush seized on the NNL slogan, and it became one of his central themes late in the campaign, rapidly disseminating through the media (Balzar, 1988a, 1988b). The 1989 and 1990 Congressional sessions saw the introduction of a great number of bills addressing NNL and lengthy discussion of several. Furthermore, a series of special
House hearings on wetlands law was held throughout 1989 and 1990 (US House, 1990). Although the rather disappointing legislative dénouement of NNL came in the form of the 1990 Water Resources Development Act (WRDA)—which contained only a paragraph mandating that the COE’s official mission include the pursuit of NNL, simply renaming the goal it had ostensibly been pursuing since 1977—the sustained national attention changed forever the representation of wetlands.

Constructing the Wetland Commodity

Most states have now passed some form of NNL legislation. Minnesota’s is both more specific and more prescriptive than the federal 1990 WRDA: it mandates wetland restoration and creation as the explicit solution to the loss of wetland services, and makes special reference to ecological conditions in different regions of the state. Like its federal counterpart, the NNL language in the 1991 Minnesota Wetlands Conservation Act (MWCA) was introduced and supported by conservative legislators from agricultural districts, and (as in 1988) the NNL issue was used extensively as a campaign issue to launch a Republican into executive office (Arne Carlson, elected governor in 1990). The next part of this paper uses texts generated during both Minnesota and federal policy formulation to observe four moments in the representation of wetlands as commodity providers.

Functional Abstraction

There is no single, correct, indisputable, ecologically sound definition for wetland because the gradation between totally dry and totally wet environments is continuous. . . . Our primary task here is to impose arbitrary boundaries on natural ecosystems for the purposes of inventory, evaluation, and management.


Wetland commodification begins with an act of reference: a diverse and complicated site is codified by a set of characteristics considered relevant by the scientist, engineer, or developer. Is it ephemerally or permanently inundated? Does it have emergent vegetation, a sedge meadow, or a shrub zone? Is it a groundwater discharge or recharge area? The coded product of this interrogation stands for the wetland. Since the 1950s, wetlands have been surveyed through the use of formal assessment methodologies and taxonomic systems, which are today the two principal tools in the process of wetland abstraction and categorization. Taxonomic classification systems provide both an imposed order and a common language for scientists, while ecosystem assessment methodologies involve paper forms,
filled out on a brief visit to a site, which allow the assessor to total up a "score" for a given site. Widely used in the 1970s as data-gathering aids to policy formulation, primarily by public agencies, since the mid-1980s ecosystem assessment methodologies have been increasingly used by private engineering firms (which sometimes use their own in-house methodologies) in negotiating compliance with wetlands regulations.

The methods by which wetlands are classified have grown from the relatively simple “Circular 39” wetland classification system (9 categories; Shaw and Fredine, 1956) to more sophisticated ones such as the Cowardin system (268 categories; Cowardin et al., 1979). Likewise, assessment methodologies such as Habitat Evaluation Procedures (formalized by the FWS beginning in the early 1970s; McCollum, 1990:311), which directed the assessor to evaluate only ecological characteristics, have been succeeded by techniques that include assessments of both ecological and socio-economic qualities of ecosystems, such as MinRAM, the Minnesota Routine Assessment Method (MDNR, 1996).

What all assessments and taxonomies have in common is that they produce a number or a tag by which the ecological unit can be named, categorized, and otherwise treated as ordinal data. This act of reference is not significantly different from that of grain in Chicago, described above: while proving very handy for the manager and scientist, it also allows the instant abstraction of services, severing the characteristic being measured from the messy uniqueness of the physical site. In the MinRAM, only yes/no answers are possible to some of the following, potentially very problematic, questions (MDNR, 1996:10–12):

- **YN** Is the area surrounding the wetland mostly undeveloped and uncultivated?
- **YN** Do the surrounding or upstream land uses have the potential to deliver significant nutrient and/or sediment loads to the wetland?
- **YN** Does the public have direct access to the wetland from public roads or waterways?
- **YN** Is the wetland in/near any population centers so as to generate aesthetic/recreation/educational use?

Not only are the meanings of “public,” “surrounding,” “significant,” and “potential” subjected to an abrupt settlement by the “YN” (a binary resolved by the individual assessor’s understanding of these words), but the focus on “use” and “access” clearly enables the representation of wetlands as services and amenities.

This transformation of an analytic tool for field ecologists into a way to abstract towards economic value has served as the springboard for capitalizing wetland services. For example, Circular 39 “Type II” wetlands became shorthand for the battleground on which environmental interests...
in Minnesota attempted to assert the economic value of ducks and natural beauty, against farmers’ assertion of their existing property value (see below). Naturally, when it became clear that assessment methods and taxonomies were the tools by which units of value were assigned, the language of classification became hotly contested. In 1987, as the NWPF convened, the COE produced the first technical manual (Environmental Laboratory, 1987) to regularize the practice of wetlands identification, and three more quickly followed from other agencies. The regulated community did not find these equally palatable. The 1989 manual (FICWD, 1989), produced by several agencies cooperatively, dictated that even ephemeral wetlands that had been farmed for many years should be protected because of their functional value to local hydrology. Because they are small, intermittent, and often isolated on private property, these wetlands fail to provide most of the services that the NNL discourse had attached to wetlands. Thus, the 1989 manual was a natural target for attack by Vice President Quayle’s Council on Competitiveness. The Council decreed that the EPA’s definition erred technically in extending the definition of wetlands too far (a perfectly reasonable distinction if one desires commodification), and produced its own manual.

The political economy of abstraction reveals multiple state agendas as much as it reveals the process of commodification. The cooperative 1989 wetlands delineation manual came into being even before any Congressional mandate had been considered, in mutual anticipation of sweeping regulatory changes that would affect each contributing agency. Even so, these agencies and branches acted on divergent agendas to control the semantic and material territory of “wetland.” Steve Robinson, Deputy Director of the FWS, admitted as much: “. . . when the Chief Executive Officer of the Country says that [no net loss] is his policy, albeit unspecified at this point, [that] gives us, conservation agencies within the Government, much more latitude, and much more strength at the table with other agencies in the Federal Government” (US House, 1990:24). One debate participant complained that “[i]t appears that the Corps and EPA are attempting to use the Clean Water Act to expand their regulatory turf right out of the water and out of the swamps and marshes and straight up on to dry land” (US House, 1990:933). In negotiations within and among the diverse interests that comprise the state, control over the terms of scientific abstraction is a powerful tool.

**Monetary Valuation**

The wetlands of this continent are libraries of nature which contain volumes of priceless genetic information.

— Sen. George Mitchell (D-ME), on the floor of the US Senate, 11/15/89 (USGPO, 1989:29248)
Something’s just a little missing here, because if you’re trying to tell me that something has value, than it also has a monetary value. There’s just no escaping it.

— Alan Colzer, farmer, Stearns County, MN (Minnesota House, 1990)

The possibility of exchange based on functional abstraction required another act of reference—this time, reference from these same functions to easily priced services. Establishing function was all well and good, but without a consistent system to translate between ecological function and market price, environmental economists warned that wetland policies were sure to fail (Shabman, 1991:20–21). As debate over NNL legislation began, there were constant calls from all sides of the debate for the pricing of wetlands. Rep. Henry Nowak (D-NY) sought an historic reconceptualization that would bring interests together in a single monetized language:

If we could provide a basis of function for the kinds of benefits that a State is receiving... [t]hen the cost of some of these programs may not be as prohibitive as they appear. ... If we could have a joinder [sic] of all the interests that are out there—in terms of flood control, ecosystem development and all the other valid reasons to protect wetlands—once that is established in people’s minds, then the value rises. (US House, 1990:1379–81)

An EPA pamphlet on wetlands protection expressed a similar sentiment, albeit more in the idiom of the Publisher’s Clearing House: “Wetlands do more than provide homes to many plants and animals. They also help people by providing free services you may not be aware of. In fact, the benefits wetlands give us are worth billions of dollars every year!” (US House, 1990:295).

The NWPF constituted a definitive step in Nowak’s process of “establishing value in people’s minds.” It had as its stated purpose streamlining and simplifying the nation’s wetlands policy. The effect of establishing the NWPF as the forum in which wetland policy was to be reformulated was to open the struggle over the meaning and content of the word “wetland” to a selected group of people who had been identified as stakeholders largely on the basis of their monetary stake in certain wetlands services. Specifically, the report formally compartmentalized the value of wetlands into fifteen services, most of which could be readily priced through application of the standard tools of environmental economics. Six of these pertained to water quality and quantity management, four to hunting and recreation, four to directly productive activities in wetlands, and only one to a function less easily priced, that of “habitat value” (Conservation Foundation,
1988:10). I will discuss only one of these functions here—duck habitat—and will then refer to positions of resistance within this moment.

The majority of legislators interested in NNL were members of Ducks Unlimited, a national nonprofit organization of hunter-conservationists, and their positions on wetlands were often expressed in terms of duck ecology rather than wetland ecology. Peter Berle, president of the National Audubon Society, made the link between wetland conservation and commodity production quite clear: “For those of us that are sportsmen, the duck factories in the Midwest are simply wetlands in another term” (US House, 1990:117). This remarkable image of wetlands as commodity-producing factories was reinforced by Thomas Eveland of the Committee for Humane Legislation, who protested the reduction of complex ecologies to a matter of duck presence or absence: “The real intent of this bill is not made clear until the latter parts of its text, i.e., that wetlands will be restored, managed and, if necessary, enhanced for maximum waterfowl production. S.804 should be designated the ‘Duck Bill,’ because that is exactly the practical thrust of this measure—the production of ducks” (US Senate, 1989:88).

In this paradigm, monetary valuation then became a matter of counting ducks. Dialogue was laden with estimates of the contribution of wildlife conservation to regional economies: “Each year in my State, in Montana, more than 20,000 people spent tens of millions of dollars hunting waterfowl. Unfortunately, the recreational and economic opportunities provided by waterfowl are in serious jeopardy” (Senator Baucus [D-MT], quoted in US Senate, 1989:1). Moreover, the duck factory was easily privatized. One Minnesota Department of Natural Resources program allowed citizens to “purchase” a pothole wetland for $100. The money went to a farmer, who agreed not to drain the land, and the “purchaser” received a picture and a certificate. “Unless there is value in raising ducks, farmers cannot be expected to keep the potholes that ducks need. This is why ducks have always lost out to farming. Ducks were not treated as a cash crop... a one-acre pothole could produce 10 mallard ducklings” (Schara, 1990:B1).

At both the federal and state levels, attaching monetized value to wetlands was allowed, while attaching nonmonetized value met with resistance. Housing developer Rick Packer spoke to the disturbing consequences of the latter:

I’m a little bit uncomfortable with the phrase “biological diversity”... as it pertains to wetland mitigation... We would like to see those rules governing mitigation be more reasonable than they are scientific, and that the mitigation... address itself to the three primary functions of a wetland which are soil or groundwater recharge, stormwater management and water quality control. (Minnesota House, 1991; emphasis added)
Throughout NNL, powerful attempts such as this to claim water management as “proper functionality” for wetlands and to exclude other functionalities (such as biodiversity, aesthetics and other hard-to-quantify public goods) defined the new wetland object. As with most environmental legislation since 1980, lawmakers invoked normative reason to limit the range of “primary” wetland functions to those with calculable value.

These monetization narratives did not go unchallenged. Two kinds of opposing narratives developed in response, one by property-rights advocates and the other by environmental scientists. Rep. Emerson (R-MO), with a normative claim as strong as Packer’s, reminded Congress that NNL had not caused wetlands to lose their older commodity value as land: “. . . [I]s a wetland an area with trees and cattails and standing water and old, decaying logs? I think it is. . . . Shall we turn substantial property holdings in this country into economically worthless property? I don’t think so” (US House, 1990:888). In Minnesota and other agricultural states, farmers vigorously protested the discursive transformation of their fields into commodities to be enjoyed by other people:

The Legislature finds that the wetlands in Minnesota provide public value by conserving surface waters, maintaining and improving water quality, preserving wildlife habitat, all these great things that I think are wonderful. But by God are you willing to pay me just a measly interest on my 2,000 dollars an acre, that’s all I ask! Or do you want to buy the whole thing, you can have the damn thing, but please don’t come here and tell me about all these great things that you want to steal from me! (farmer and State Representative Sylvester Uphus, quoted in Minnesota House, 1990)

Rep. Uphus’ desire for appropriate levels of monetary compensation typified the rapidly expanding protest against the unjust federal “takings” of private land, and the suspicion that NNL—among other environmental policies—amounted to a federal land-grab.

Some ecologists also attempted to resist the later steps towards commodification after embracing the first (scientific abstraction). One common concern was that, once functions were described monetarily, more valuable functions (such as duck habitat) would be promoted at the expense of less valuable ones (such as nongame fish habitat). Thus, Jan Goldman-Carter of the National Wildlife Federation could represent the restoration urged by the NWPF as potentially degrading to the environment (US House, 1989:11). While most scientists who testified in Congressional hearings on wetland policy seemed to accept the representation of “the service-providing wetland” proposed by the NWPF—perhaps because of their desire not to appear riven by internal debate in front of Congress—Robert Pierce of the Wetland Training Institute articulated a striking challenge to the entire
discourse of NNL, noting that a) individual wetlands do not serve all desired functions and b) non-wetland areas serve many of these same functions. “In short,” Pierce testified, “the range of overall value of wetlands is just as great as the range in value of uplands” (US House, 1990:1346). His ecologically sophisticated argument points to the problems faced by wetland commodification narratives: wetlands’ spatial heterogeneity and the landscape scale of many ecological processes present serious problems to the process of reference from function to price.

**Spatial Abstraction**

As capital extends its sway, the entire globe is partitioned into legally distinct parcels, divided by great white fences, real or imaginary.

— Neil Smith (1990:85)

To achieve commodity status, wetland services had to be abstracted from their place-specificity: in an ideal form, all wetlands would be seen as a bundle of commensurable and physically movable functions. Through the NWPF’s practice of representing wetland mitigation as the solution to wetland destruction, wetlands in one place were made replaceable by wetlands in another place. These narratives, then, tried to detach wetland functions from the wetlands where they were materially manifest, and make them travel around the landscape in, to use Neil Smith’s words, a constructed “absolute space.” The NWPF attempted to establish an absolute space continental in scale by defining a national “wetlands base” consisting of 95 million acres, performing at least 15 monetarily valuable functions: “Although calling for a stable and eventually increasing inventory of wetlands, the goal does not imply that individual wetlands will in every instance be untouchable or that the no-net-loss standard should be applied on an individual permit basis—only that the nation’s overall wetlands base reach equilibrium between losses and gains in the short term and increase in the long term” (Conservation Foundation, 1988:3). This represents a significant departure from earlier moments in the commodification process. Until this point, most actors supported commodification narratives as wetlands’ proper valuation as public goods, which would serve to protect their ecological integrity from market forces. However, the notion of spatial exchangeability uncovered a deep rift between environmentalists and business interests, because it implied the separability of monetized services from the wetland site.

The continuing reference away from material wetlands ran into another difficulty at this point. Unlike the size and weight of grain, measurements of the duck habitat and aesthetic value and hydrologic storage qualities of wetlands depend on a multitude of material linkages with other sites in the
local landscape that are not included in anybody’s regulatory definition of “wetland.” Although functions are assigned monetary values, the relationship between function and landscape position means that one cannot speak of a national-scale “wetlands base” as having any inherent functions. As a result, NNL narratives were caught in an irresolvable tension between representing wetlands as valuable in terms of acreage (which had the advantage of spatial homogeneity but lacked arguments about the monetary value of services) and representing them in terms of function which was priceable, but spatially heterogeneous in distribution). Various schemes attempted to merge the two. For example, it was already common practice for the COE to create more mitigation acres for certain wetland functional classes than others by demanding mitigation at a 2:1 ratio (two acres of mitigation per acre of destroyed wetland) for some wetland functional classes and at only a 1:1 ratio for others. Alternatively, some NNL participants insisted on “in-kind” mitigation: that is, the created wetland must be of the same class as the one destroyed. However, the meaning of “in-kind” was itself contested, and varied with the assessment method used to determine the nature of the loss; in addition, there was of course strong resistance from business interests to ecologically sophisticated interpretations of “loss” (Brinson and Lee, 1989). A World Wildlife Fund publication made the case for a strong definition: “No net loss is most readily assured if compensation is: ‘in-kind’ (i.e., the same wetlands types in the same hydrologic settings); with equivalent values, functions, and area, and; on or very near the location (e.g., watershed) of the losses” (WWF, 1992:14).

This tension between areal and functional definitions of loss was explicit at many moments in the debate, and often took the form of conflict between scales of governance. Typically, local arguments about diverse wetland function would counter extralocal narratives that treated large areas as homogenous. Ralph Morgenweck of the FWS offered a typical federal-scale conception of wetlands loss accounting: “If you think about wetland conservation in terms of a ledger sheet account, our annual losses, or outlays, and our gains, or income, range from 20-25,000 acres. Each year, almost 20 times more wetlands are destroyed than are restored or created” (US House, 1990:395). The implications of Morgenweck’s national view were challenged in recurrent assertions that loss in one place is not equivalent to, or even commensurable with, gain in just any other place.

The case of Louisiana is interesting in this regard. Since the Mississippi River has been constrained by COE engineers from meandering across its deltaic plain in southern Louisiana, the lack of silt deposition in the delta has resulted in the loss of approximately 60 square miles of wetlands per year through subsidence. Moreover, nearly all of the coastal plain is currently classified as wetland, meaning that any mitigation site would have to be located either on rare terra firma, or entirely outside of the region. Louisiana’s representatives in Washington have been quick to point out
that any federal NNL mandate would put an end to development in the area. On one occasion, Newman Trowbridge spoke for the Louisiana Landowners Association:

\[\ldots\] adoption of a national policy of no net loss of wetlands unless specifically providing otherwise will undoubtedly be applied to all wetlands irrespective of their public use, of their public value or their location. \ldots\] There are significantly fewer practical alternative non-wetland sites in Louisiana than in other states and considering these facts, the presumption of available non-wetland sites \ldots\] in EPA’s 404 B1 guidelines is essentially illusory. (US House, 1990:580–1)

The acceptable boundaries of NNL’s abstract space were thus subjected to a great deal of pushing and pulling in Louisiana. Louisiana’s Representative Tauzin and Senator Breaux both used Trowbridge’s logic to argue that, because of its unique wetland ecology, Louisiana could much better safeguard wetland functions through locally defining and protecting important functions than through area-based mitigation (US House, 1990:501). They demanded control over the process of defining the space within which mitigation would be permitted, so that wetlands in the delta could be replaced by mitigations hundreds of miles away in the wetlands-depleted north of the state. David Soileau, of the Louisiana Governor’s Office, called attention to the special circumstances of Louisiana’s position downstream from most of the nation’s agricultural areas: “It is important for you, as National leaders, to understand that we did not get into this predicament alone. Dredging and leveeing of rivers in upper parts of the Mississippi River Valley, to provide for navigation and flood control, forced increased runoff into Louisiana. This, of course, required the construction of levees and floodways in this State to alleviate flooding caused by the increased runoff” (US House, 1990:553).

All states could have made similar exceptionalist arguments about wetland functions and landscape relations. Ultimately, however, the struggle to define the appropriate space for exchange was displaced downscale. The question of measuring “loss” was left to the COE, where in practical terms it is often decided on a case-by-case basis by officials at the regional office (Augustin, 1997). In the end, Federal rulemaking procedures did not produce a national spatial formula for wetland commodification, and federal actors were ultimately content to let states take up the issue for themselves.

This trend is present at other scales of governance. The original text of the first NNL bill introduced in Minnesota made no reference to special conditions anywhere in the state. However, following heated protest from residents in the northeastern third of the state (an area of vast peatlands and lakes covering over 80% of the landscape, and a stronghold of pro-union politics), the 1993 amendments to the Minnesota Wetlands
Conservation Act conceded that wetland impacts in this area need only to be mitigated at a ratio of 1:1, as opposed to 1:2 across the rest of the state. A further spatial subdivision was then added to regulate counties with 50%–80% wetland cover, and plans were made to encourage mitigation in the southern zone for wetland impacts in the northern zone. Options for the scale at which net loss should be calculated included the project site, the watershed, the county, or the DNR administrative district; each option, of course, had its constituency. Legislators from the northern part of the state argued for a plan that “allows the local county much more flexibility to deal with local variation of wetlands across the state. The plan is based on a ‘no net loss’ of wetland value but the counties have control of how it is achieved” (Stumpf, n.d.). Continuing advocacy from groups such as the Minnesota Landowners Rights Association (MLRA, 1997) has forced a thorough review of rules, detailed in the Minnesota Wetlands Conservation Plan (MWCPP, 1997). Much like the NWPF, the Plan attempted to bring together all stakeholders to decide on regional subdivisions and acceptable mitigation rates. Of the “four basic challenges” it identifies to the state’s wetland conservation system, the first is “To recognize and apply regional differences in wetlands policies and decisionmaking” (MWCPP, 1998a:2).

There can be no commoditization without a market, and where the federal government failed to provide one the state of Minnesota negotiated a set of rules and geographic subdivisions that defined the boundaries of trade. Unlike the federal government, the state of Minnesota has—so far—retained central authority over administering the practical meaning of “loss,” including the authority to determine the scale of the space within which “net” is to be calculated, although these have been constantly negotiated with local actors and within components of the state itself. While it has not defined wetlands statewide in complete abstraction from their material contexts, it has been successful in defining a set of spaces within which wetlands are held to be commensurable based on functional categories, identified as monetarily valuable, and able to be moved without loss through mitigation and restoration.

**Exchange**

Senator John Chafee (R-RI): “. . . has anybody here seen successful mitigation, or what you’d call wetlands restoration? Raise your hand, have you ever seen it?
(No response)
Chafee: “Did you get my question?”
(No response)
Chafee: “It doesn’t exist?”

— US Senate (1989:9)
Marx makes it clear that there can be no commodity without exchange (1976:131). Ultimately, the physical act of exchange requires the creation or a wetland mitigation or restoration site, spatially disjunct from the site of impact, which actually performs the services outlined by the NNL discourse. Exchange also requires institutional and market mechanisms such as wetland mitigation credits, assessment forms tailored to ecoregional conditions, and stormwater utility tax structures that account for wetland presence or absence. Therefore, it is worth examining the degree to which this has been realized in the regularized creation of wetland services in exchange for hunting permit revenue, property value, or reduced stormwater utility taxes: in short, the degree to which wetlands have become a new space for capital accumulation.

Louisiana’s Representative Tauzin had a clear sense of how this system should work, perceiving a strong synergy between capitalist exchange and wetlands preservation: “... when you do spend money to save a wetland, or save a marshland, that is going to be lost otherwise, that becomes an asset in the mitigation bank. That is tradeable, saleable... You have a saleable asset that you can trade off with others who are acting and working with you in the area of living and developing and saving, if you will, the lands that we live in” (US House, 1990:614). Many shared Tauzin’s enthusiasm. Ted Brown, Vice-President of the Arvida environmental engineering firm, urged that mitigation be considered equal to, if not better than, preservation: “... we have actually found that admittedly improved ecological solutions to wetlands mitigation must be ignored in order to pay homage to [wetland impact] avoidance” (US House, 1990:917).

However, the ability to create stable spaces for commodity exchange is in doubt. The NNL discourse has advanced largely on the assumption that our technical ability to recreate wetland services is sufficient to the needs of exchange. Doubts expressed by ecological scientists and even by the NWPF have been marginalized by appealing to an undifferentiated category of “wetlands” (as Brown does above), rather than acknowledging the difficulties in restoring specific wetland functions or types. No matter what commodities might be desired, the science of ecosystem creation and restoration is very young, and most restoration scientists voice grave doubts about our ability to fully restore any ecosystems or ecosystem functions (Zedler and Weller, 1990). The ability to restore functions differs dramatically with different wetland types, with coastal salt marshes being perhaps the most “restorable” and ephemeral isolated basin wetlands occupying a position near the other end of the spectrum (Zedler, 1999); some types of wetlands are impossible to create or restore (MWCPP, 1998b:10). These moves to differentiate the monolithic concept of “wetland” threaten the entire basis of exchange by casting doubt on the ability to recreate functions no matter what adjustments are made to the boundaries of the absolute space of the wetland commodity.
There is considerable disagreement within the community of restorationists over these issues, and since the advent of NNL the practice of restoration ecology has become a highly commercialized and popularized endeavor. There has been intense pressure to “harden” the science through hundreds of technical manuals, training programs, professional conferences, and important compilations like the National Research Council’s *Restoration of Aquatic Ecosystems* (1992) and Kusler and Kentula’s *Wetland Creation and Restoration* (1990). However, working against these efforts, costly training workshops are now churning out hundreds of superficially-trained “wetland delineators” each year, and the general lack of non-commercial accreditation and certification requirements guarantee that the ecology of the mitigations created by NNL will continue to be responsive to the wider political economy.

Wetland mitigation banks are an integral part of the vision of exchange expressed by Tauzin. These institutions, which can be either private or state-run, consist of a regional collection of parcels of land on which wetlands have been created (Fig. 1). In its administration of the “Minnesota state wetland bank” described below, the Minnesota Board of Water and Soil Resources is in some ways analogous to the Chicago Board of Exchange: “Restored or created wetlands can be deposited in the bank as wetland credits....The account holder is the owner of the banked wetland and the credits. Wetland credits are based on the wetland type, acreage, the extent of any pre-existing wetlands at the site, and other ‘public value’

![Figure 1](image-url)
features that contribute to the quality of the wetland” (MWCPP, 1998b:4). While credit transfers are only allowed within the geographic restrictions discussed in the previous section, it is not hard to see how wetland banking can be understood as the full commodification of wetland services, and the triumph of capitalist nature. However, in a rare study of the ecological condition of mitigation bank sites, the state of Minnesota found that banked mitigations showed a range of conditions, with no necessary relation to the condition of the site they were supposed to replace (MWCPP, 1998b:iii). Furthermore, the reason for this divergence was attributed to the contingencies of individual site construction, and bank site location was found to be “almost entirely dictated by the presence of landowners who are willing to undertake wetland creation or restoration projects” to be banked (MWCPP, 1998b:iii).

As hinted at in the opening paragraph of this article, our lack of ability to reproduce ecological function has led to the creation of some peculiar material landscapes. In the South Washington Watershed District (SWWD), in which Cheryl and Jerome Brunner’s house sits, a survey of 23 mitigation sites revealed few instances of acceptable duck habitat and negligible capacity for flood protection (Robertson, 1998). Although these conditions also were found in the degraded wetlands that these mitigations replaced, the ability of the mitigation process to create spaces for the exchange of wetland values outlined by the NWPF must be seriously questioned. Furthermore, while the wetlands destroyed in the SWWD were of diverse functional classes, the vast majority of mitigations were classified as a single type by the Cowardin et al. (1979) system. To return to James O’Connor’s prediction that “capital remakes nature . . . in its own image” (1994:158): the image of capital (the diverse functional landscape narrated by NNL) does not look much like the wetland behind the Brunners’ house in Woodbury, Minnesota.

In these studies, the deep disconnect between the mitigation credit and the functions of the original wetland is expected. Such is the nature of commodity abstraction; the inability of capital to detect or act on the degradation of the actual site is precisely the crisis tendency identified by James O’Connor’s “second contradiction” of capitalism. However, there is an equally deep disconnect between ecological understandings of produced nature (the mitigation site) and capitalists’ representation of produced nature as a bundle of commodity functions. The wetland landscape produced under capitalism does not automatically become functional for the demands of capitalist accumulation; it appears incompletely capitalized at best. By reading capital’s demands directly onto the material landscape, simple visions of capitalist nature risk serious mischaracterization of the form of crisis. Wetland mitigations are complex spaces, and capitalism has not created in them simple ecologies.
Wetland Futures?

Our profession is emerging. Eventually habitats will be designed, engineered, constructed and evaluated in accordance with codes, regulations and performance standards that have yet to be written. . . . And already hundreds of persons are struggling to make a living doing restoration work.

— Restoration consultant Marylee Guinon (1989:56)

To return to the central claims I made in my introduction, the case of NNL bears two important lessons for the study of nature under late capitalism. The first is that nature moves towards commodity form, not automatically, but through political struggle. Without the practice of legislators, environmentalists, engineers, and all the other actors discussed above, the process might stall at any point. Even once the NWPF and President Bush had succeeded in imposing a frame of “no net loss” over most wetland narratives, institutional, private, and regional interests mounted resistance and requested modification. James O’Connor might reasonably see NNL as a set of narratives aimed at restoring the conditions of production so as to allow continued capital accumulation and expansion into formerly uncapitalized domains: “no net loss of capitalism,” part of a larger strategy of the “politically guaranteed existence of labor power, urban infrastructure and space, and environmental conditions” (1998:149). This viewpoint is logically appealing, and even explicitly advocated by many supporters in the NNL debates. However, it is also compelling to view NNL as, for example, a lever by which urban Minnesota could exert coercion on a politically unruly upstate region, or in light of the countless other regional and cultural struggles in which NNL became enmeshed.

It is also important to understand that the success of NNL as a discourse does not translate into the material restoration of the conditions of production. The second lesson to be drawn from NNL is that the physical form of wetlands—their differentiation and landscape embeddedness—has mattered a great deal to the commodification process. Representations of a monolithic national “wetlands base” have thus been easily countered by regional representations of specific conditions, or scientific representations of complex classification systems. Ecological sophistication has been late in coming to the social sciences (Zimmerer, 1994). If we are to coherently discuss the capitalization of nature, we must be careful to specify nature, just as we must now shun all old familiar monolithic categories and carefully specify gender, class, and race. Wetland environments were no more a blank slate prior to the arrival of NNL than was the semantic category “wetland,” and we will require input from ecological scientists in order to study such environments as socionatural hybrids, in Latour’s (1999) terms. Concepts of capitalized nature, while indispensable to the
comprehension of developed and developing landscapes, do not in their simpler form address important differences among the wetlands destroyed by capitalist development, the wetlands created to replace them, and the amenity-based representation of wetlands in the commodification process.

Nor do recent poststructuralist attempts to retheorize the mutually constitutive human/nature unity go far enough. Castree and Braun’s (1998) edited volume and approaches such as Swyngedouw’s (1999) are invaluable in saving us from bourgeois epistemologies which tell us to focus on some “interplay” between essentialized “nature” and “culture.” However, Bunker’s 1992 critique largely stands today: “[N]ature remains an unspecified and undifferentiated category in their theoretical discussions, and disappears altogether in their discussions of production and reproduction” (1992:80). Without such sophistication, any attempt to incorporate, for example, the hybrid entity pictured in Figure 2 into an explanatory framework is destined to be unsatisfactory.

In March of 1993 the Chicago Board of Trade opened the process of bidding for pollution credits, and the first day’s trading exceeded $21 million (Dowie, 1995:274). It speaks to the power of capitalist nature that such a real market in wetland futures is thinkable and even possible, and indeed may not be far off. However, more mundane possibilities are disturbing enough, and it is vital that ecologists begin to recognize the ecological consequences of acquiescence to commodification narratives. It was in part

Figure 2  A wetland construction project near Winnipeg, Manitoba, sponsored by Ducks Unlimited, Inc. and more or less in the shape of their corporate logo. Analysis of such an object requires an epistemic commitment to the simultaneity of representation and materiality (Moore, 1993). Photo credit: Robert R. Taylor.
ecologists’ enthusiastic participation in such narratives that allowed the NWPF to move forward using the common language of money. While NNL opened an exciting possibility for scientists to renegotiate the functional categories used in regulatory definitions of “wetland,” the cost of admission was acceptance of a commodifying language that denied scientists the privileged power to specify important functional categories.

Moreover, as shown above, the common assumption that “getting the commodification narratives right” will lead to appropriately functional landscapes is misguided. Scientists concerned about environmental degradation should treat NNL with the same circumspection as other “sustainable development” discourses. There is every reason to suspect that NNL smuggles in many of the same assumptions about the compatibility of growth and conservation and the maintenance of existing capital relations that critiques of sustainable development (e.g., Lele, 1991) have exposed. Indeed, the sites of most active NNL policy application are in the sprawling exurban fringes of America, where our “development” is now being marketed as “sustainable” in some unspecified way.

Finally, I want to say a word about restoration science and its capacity for mediating the entry of nature into capital relations. David Harvey notes that “[c]reated ecosystems tend to both instantiate and reflect . . . the social systems that give rise to them” (1996:185). If Harvey is right that ecological restoration embodies the dialectic between society and nature, then restoration sites attain special political significance. Cindi Katz clarifies the exciting potential: “Restoration ecology offers a more promising environmental politics than preservation. Rather than enshrining nature, restoration works it; rather than ignoring, eclipsing, defacing or erasing environmental knowledge, restoration is premised on its ongoing production and exchange” (1998:56). However, as the story of NNL demonstrates, there is considerable danger in embracing the field of restoration science as inherently liberatory. Katz also warns that “restoration ecology tends to produce the natural and naturalize the produced”—to invite us to forget the human struggles that have shaped past landscapes, as well as the work that creates the restored one (1998:57). In this respect, restoration has a deeply regressive tendency. The prominent role of restoration ecology in constructing discourses of “the frontier” and “tradition” in new urbanist development projects such as Prairie Crossing in northern Illinois (Zimmerman, forthcoming) should raise the eyebrows of even the most apolitical of scientists. And while Katz is correct that most restoration projects have so far been implemented at too small a scale to figure in environmental politics at a national or global scale, the emergence of mammoth projects such as California’s CALFED Bay-Delta restoration program (covering the area from Sacramento to the Golden Gate) or Florida’s Everglades restoration project (six billion of the eight billion dollars involved in which will actually go to providing potable water for the
expanding suburbs of northern Miami) indicate that restoration is in the
process of “jumping scale” (Katz, 1998:57).

Surely Gramsci is right (if quoted somewhat out of context) that “in the
movement of history there is never any turning back, and that restorations
in toto do not exist” (1971:219). In practicing restoration ecology with
awareness of this, there is room to celebrate the liberatory potential in
renegotiating what counts as “nature.” NNL constitutes such a negotia-
tion, and by following restoration ecologists we will surely be led to more.
Restoration ecology is very much an uncertain science, in which there are
few uncontested principles, great freedom in fact-building, and a frequent
conflict over proper disciplinary boundaries. By understanding restora-
tion as a simultaneously physical and representational practice creating
wetlands as commodities, we may see it as a site of potential political and
cultural transformation.

Acknowledgments

I would like to thank Matt Turner, Karl Zimmerer, Eric Sheppard, Rod
Squires, Susan Galatowitsch, and Joël Wainwright for their patient and
perceptive comments throughout the formulation of this paper, as well as
referees David Demeritt and Richard Peet and a further anonymous ref-
eree for very helpful suggestions on the final drafts. I also gratefully
acknowledge invaluable aid from Brett Emmons of Emmons and Olivier
Resources, Steve Kernik, environmental coordinator for the City of Wood-
bury, and Ralph Augustin of the St. Paul Office, COE. This research was
supported by a Jacob K. Javits Fellowship from the US Department of
Education, and by a Summer Research Fellowship from the University of
Minnesota Department of Geography.

Notes

1. In this paper I am employing a broader usage of “restoration” than is gener-
ally applied by practitioners such as members of the Society for Ecological
Restoration. Wetland mitigations are not usually considered acts of restora-
tion, in that few of the ecological characteristics of a given site (which may not
have even “originally” been a wetland) are restored. However, since strict
definitions of restoration are a highly contentious issue, and we lack a
broader term to indicate the application of ecological science to restore certain
desired functions to a degraded landscape, “restoration” will have to do. In
discourse about “no net loss,” this is usually the sense in which “restoration”
has been used, and—accurate or not—the word has entered the political
realm as nearly synonymous with “mitigation.” See Higgs (1997), Renner
(1994), and almost any issue of Restoration and Management Notes for coverage
of the semantic struggle.
2. The physical space of wetlands has, of course, been commodified as real estate for several hundred years; the new commodities being addressed by NNL are better conceived as “wetland services.” However, the distinction between the two is ecologically somewhat spurious, a feature which (as will become clear) created problems for the commodification process.

3. In reiterating this couplet I mean to insist that we must take both scientific and non-scientific representations of nature seriously in discussing the commodification process. I do not mean to imply any kind of bifurcation separating materiality (“ecology”) and representation thereof (“culture”).

4. The importance of Harvey’s conception of the analysis of moments has been summarized by Hartsock: “Thus, the concept of the moment . . . reminds us that social processes must be understood as flows, in which a ‘thing,’ in this case, capital, can assume at one point and from one perspective, the form of money; at other points and other perspectives, the form of an independent social power. Harvey suggests that moments are linked to but not bounded by time or space in any simple way; they are instead conceptual tools that can help to address complex and overdetermined social relations.” (1998:708)

5. While Cronon finds the initial creation of value to take place in natural processes, as opposed to the labor process or the exchange process (Kearns, 1998), he correctly notes that the assignment of value (value’s epistemology, rather than its ontology, if you will), is achieved socially: “Cronon’s identification of the commodification of nature as the prelude to the transformation of nature by economic and ecological imperialism is a more satisfying explanation than one which saw the process of primitive accumulation as being primarily one involving the commodification of labor power.” (Kearns, 1998:385)

6. Federal use of the term “wetland” dates to a 1956 publication by the Fish and Wildlife Service, and its euphemistic use for “swamp” seems to have been occasional since the turn of the century (NRC, 1995:43).

7. The difficulty in abstracting and reducing ecosystem services to dollar values has been considerably ameliorated by the rise of market-based environmental tools such as contingent valuation, the creation of pollution credits, and fiddling with discount rates. These practices are founded upon the neoclassical principle that environmental protection is effected when the right price signals are sent to rational individualistic actors in a free market. See Hockenhein et al. (1997) for an enthusiastic review.

8. House File 31, introduced 12/15/1988, read in its entirety: “No public waters or wetlands may be drained, no rules may be promulgated authorizing drainage of public waters or wetlands, and no permit authorizing drainage of public waters may be issued” (Marsh et al., 1988:1).

9. Senator Chafee was the influential chair of the Senate Committee on Environment and Public Works, and a committed environmentalist. His death on October 24, 1999, marked the end of concerted legislative skepticism about the full commodification of nature. Although he had few qualms about attaching commodity values to nature, he certainly did not see market forces as the best steward of the environment. This latter view is supported by younger politicians of all parties, particularly by his successor as the Committee’s chair, Senator Bob Smith (I-NH).

10. Since the Board’s action, private firms have established their own markets for pollution credits, often serving specific regions and types of pollution. Even before Florida’s establishment of a state wetlands mitigation bank, a private firm called Florida Wetlandsbank had begun to sell mitigation credits for $45,000 per acre (Hockenhein et al., 1997).
References


Minnesota House of Representatives Committee on Environment and Natural Resources (1991) Audiotape of hearings concerning HF 1, 12 February.


Natural Resources Defense Council v. Callaway (1975) 524 F.2d 79 (2d Cir.).


Schara, R. (1990) A gift idea that is all wetlands. Minneapolis Star-Tribune 9 December:16C.


Department of the Interior, Office of River Basin Studies, Fish and Wildlife Service.


Zedler, J.B. (1999) Professor of Botany, University of Wisconsin-Madison. Personal communication, March 6, Madison, WI.


