Annals of the Association of American Geographers

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/raag20

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Published online: 20 Mar 2013.

To cite this article: Morgan M. Robertson & Joel D. Wainwright (2013) The Value of Nature to the State, Annals of the Association of American Geographers, 103:4, 890-905, DOI: 10.1080/00045608.2013.765772

To link to this article: http://dx.doi.org/10.1080/00045608.2013.765772

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The Value of Nature to the State

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In recent years geographers have produced a considerable literature on the creation of markets in environmental goods and services. This literature reveals numerous complications with such market-based conservation strategies, yet it has failed to address the conception of value that underlies capitalism and drives the capitalist state. To address this gap, we offer an analysis of how the concept of the value of nature has been taken up in U.S. environmental regulatory debates over the creation of markets for wetland services, where state actors creating new regulations must attempt to specify the value of nature. In 2008 the U.S. government adopted a rule governing the creation and sale of wetland credits. This rule initially attempted to define value as a way of both grounding the credit commodity in underlying phenomena and defining the object that state intervention was designed to protect. But in final negotiations and drafting the term became so controversial that its definition was deleted and its use radically restricted. To draw meaning from this situation, we draw on nineteenth-century debates over value in political economy. Our central finding is a cyclical tendency for conflicts to arise over whether to define value as something either inherent (e.g., to a physical process) or essentially relative. Agents of the state involved in creating environmental policy today are caught in the same dilemma as were value theorists of the mid-1800s: They recognize that they must specify the value of nature in justifying state environmental strategy and the expansion of capital into ecosystem services but struggle with the limits of doing so by extracting elements of nature and placing them in capitalist value form. Political ecologists and others will similarly struggle to understand the basis on which capitalist states confront nature—even as the consequences of this encounter are increasingly well documented—without a return to value theory. Key Words: ecosystem services, energy, Marx, nature, political ecology, state, value, wetlands.

近年来，地理学者生产了众多有关环境商品与服务市场的文献。这些文献揭露了市场化环境规范中的诸多复杂性，但却未能着手处理支撑资本主义并驱动资本主义国家的“价值”概念。为了回应这一缺失，我们将分析“自然价值”的概念如何被纳入美国环境管制为湿地服务创造市场的争议之中，其中制定规则的国家行动者，必须尝试具体指出自然的价值。2008年时，美国政府采用了一项规范来管制湿地信用的创造及贩售。此一规范最初企图将价值同时定义为将信用商品奠基在基础现象之上，以及界定国家介入计划所保护的对象之方式。但在最终协商与草案拟定中，“价值”一词却高度受到争议，其定义因而被删除，而它的使用亦彻底受到限制。为了揭露此一情况的意涵，我们运用十九世纪政治经济学中有关价值的辩论。我们的主要发现，将价值定义为内生之物（例如物理过程一般）抑或本质上是相对性的冲突之产生，实则具有周期循环的倾向。现今参与制定环境政策的国家代理人，陷入与十八世纪中叶的价值理论家面临的相同困境。他们认识到必须具体指认自然的价值，以正当化政府的环境策略与延伸至生态系统服务的资本扩张，但他们亦需透过从自然中截取元素并将其置入资本主义的价值形式，与上述做法的限制相互搏斗。若不回到价值理论，政治生态学者及他将同样无法理解资本主义国家遭遇自然的基础——即便这些遭遇的结果逐渐被妥善地记录下来。关键词：生态系统服务，能源，马克思，自然，政治生态学，国家，价值，湿地。

En años recientes los geógrafos han producido una abundante literatura sobre la creación de mercado de productos y servicios ambientales. Esa literatura revela numerosas complicaciones con las estrategias de conservación basadas en mercado, pero aun así se queda corta en abocar el concepto de valor que subraya el capitalismo y que orienta al estado capitalista. Para enfrentar esta brecha, ofrecemos un análisis sobre el modo como el concepto de valor de la naturaleza se ha utilizado en los debates de regulación ambiental de los EE.UU. sobre la creación de mercado para servicios de humedales, donde los actores estatales en trance de crear nueva normatividad deben intentar especificar el valor de la naturaleza. En 2008 el gobierno norteamericano adoptó una norma que gobierna la creación y venta de créditos para humedales. Esta norma intentó inicialmente definir el valor como el modo, tanto de justificar el crédito en fenómenos subyacentes, como de definir el objeto para cuya protección se diseñaba.

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I
n early 2006, the U.S. federal government issued proposed regulations to govern a market in ecosystem services. In the contentious process of writing these regulations, some of the most intractable battles concerned the definition of an apparently simple concept: value. The 2006 proposed regulations included the following definition:

**Values** means the utility or satisfaction that humans derive from aquatic resource services. Values can be described in monetary terms or in qualitative terms, although many of the values associated with aquatic resources cannot be easily monetized. Values can be either use values (e.g., recreational enjoyment) or non-use values (e.g., stewardship, biodiversity). (U.S. Army Corps of Engineers and U.S. Environmental Protection Agency [EPA] 2006, 15535)

Achieving this language was no seamless fiat of neoliberal ideology. It emerged from two years of heated debates, where roomfuls of economists and bureaucrats—representing numerous state institutions—argued over the terms that would shape the new markets in which environmental services would be exchanged as commodities.2 The participants were deeply committed to the notion of nature’s value yet unable to agree on its meaning and its measure. Notwithstanding these disagreements, everyone seemed to sense that the concept of value was fundamental. Even as they disagreed on how to encode it into regulation, none could erase value from their vernacular.

Nevertheless, when the final rule was issued by the U.S. EPA and Army Corps of Engineers in April 2008, this definition of values had been removed and the term’s use in rule text was restricted dramatically. Why would state officials vociferously debate the value of nature only to ultimately suppress its legal definition? What do conflicts over the concept of nature’s value tell us about the encounter between capitalism and the natural world today?

Today it is common for politicians to say that our natural environment is threatened, or even—to cite President Obama’s victory-night speech in Chicago (2008)—to claim that “our planet is in peril.” Whether such statements are hyperbolic or not, in recent years ecologists and those who govern the environment through state agencies have been charged with specifying the value of nature. From the United Nations (Millennium Ecosystem Assessment [MEA] 2005), to the flagship of academic ecology (Ecological Society of America and U.S. Union of Concerned Scientists 2006), to the halls of the federal government, economists and ecologists alike call for the creation of regulations, policies, and performance criteria that will protect nature, and this responsibility is increasingly conceptualized in terms of sustaining the value of the environment. But what exactly is this value of nature—so widely invoked, so rarely defined?

In contemporary environmental politics, value is typically spoken of in a dual fashion. On one hand, value is seen as a quality that inheres in material substances. The value of a tree, for instance—whether calculated as wood, carbon, habitat, or some combination of these and other things—is in the tree. The tree thus has an intrinsic value that is inseparable from its very materiality. On the other hand, the tree’s value is seen as immaterial and separate from the tree itself—indeed, this value is not in the tree but expressed by money. It is this intangible, relational quality—the value that the tree could obtain as a commodity, sold on a market—that seems to motivate action on the part of the state.

From the perspective of nineteenth-century political economy, this is a familiar dualism. In this article, we connect nineteenth- and twentieth-century debates over value to today’s ongoing efforts to create new spaces for capital accumulation in nature, and we consider the consequences for geographers of failing to inquire into the definition of value that underlies...
modern environmental governance. Our analysis is structured in two parts. In the first half of our article, we examine the dispute over writing new regulations for producing and exchanging ecosystem services as commodities. Our aim is to show that the definition of value became an important point of contestation in the attempt to develop policies that work to define nature as a commodity. We then argue that the analysis of environmental governance by geographers would benefit from revisiting Marx’s theory of value.

The second half of our article takes up this project by reviewing approaches to value through three distinct literatures: one from nineteenth-century political economy, another from environmental economics, and a third from recent work in political ecology. We find that although there is extensive scholarship on Marxian value theory, neither environmental economists nor political ecologists have squarely faced the question of how value is defined in their subject areas; in fact, they have theorized value in similar, unsatisfactory ways. Although they have often parted company with mainstream economists on environmental policy and the goals of state intervention, both environmental economists and political ecologists have largely accepted (perhaps without recognizing it) the utility theory of value that originates in the early nineteenth-century writings of British political economist Samuel Bailey (1791–1870). By recapitulating Bailey, political ecologists miss an opportunity to understand the nature of environmental change under state-governed capitalism.

The State of Value: Inside the U.S. Environmental Protection Agency

For three years (2004–2007), the first author worked as a member of the staff of the U.S. EPA on the development of federal rules to govern a market in wetland credits. As a component of a larger neoliberal project to expand market relations to new sectors of government, the creation of markets in wetlands credits in the late 1980s has been seen as a shining success, if relatively modest in scope (Robertson 2004, 2006a; Robertson and Hayden 2008). By the late 1990s there was a growing industry of entrepreneurs who sell wetland credits to developers (who are allowed by regulation to purchase them to compensate for the destruction of wetlands through development). This community agitated for consistent federal regulations that would undergird their market activity and ensure the safety of capital investments in their industry. Hence, in late 2003, Congress directed the EPA and U.S. Army Corps of Engineers to write a federal rule establishing “equivalent standards and criteria for all forms of compensation” required in the Clean Water Act Section 404 permits (which authorize impacts to wetlands). Prior to this, no federal statute had made reference to the market in wetland credits—which by 2005 was a $700 million market (Hough and Robertson 2009)—and no binding standards had been issued defining the nature of wetland credits as a commodity.

Federal rule-making is painfully detail oriented, and the creation of the wetland compensation rule between 2004 and 2008 was often a matter of obsessing over punctuation and definitions. The word value played an especially important role in the text in describing wetlands and other aquatic elements of the environment as if they are already commodity-like, even if they had no price. Value, however, was never defined in the hundreds of federal documents issued on wetland policy from the 1970s up to the present, and over that time the term itself was frequently used in contradictory ways. In federal texts on wetland regulation, many of which provided crucial background guidance for the 2008 rule, value is often encountered in a triad in which three elements of wetlands are of concern to regulators: functions, services, and values (e.g., EPA 1980; U.S. Army Corps of Engineers and EPA 1990). Thus, the ambiguity surrounding the meaning of value is sheltered by the presence of two more concrete terms. This trio emerged in early drafts of the rule and persisted throughout years of rule-crafting. Yet while the meanings of functions and services were defined in these early drafts with a minimum of controversy, the definition of value proved elusive. Although the word appeared thirty-eight times in a December 2005 draft of the rule, there was no entry for value in the definitions section of the rule (an expansive section that defined forty-three terms of art as mundane as day and as obscure as in-lieu fee program). Nearly all appearances of value came in the context of “functions, services and values” (twelve times) or “functions and values” (ten times). The word value appears alone and unaccompanied thirteen times but never in the context of describing the property of an ecosystem—always, instead, to describe the price of credits traded on the wetland banking market. This pattern is consistent across the early drafts of the rule, a text of nearly 48,500 words: Alone, value narrowly signifies the price of the already-defined commodity; when accompanied by function and
service, value acts as a placeholder for measurement—a signal that the quality of comparability and utility fulfillment is present, if latent.

An explicit debate over the meaning of value erupted during February 2006 White House meetings, where the draft rule was vetted by the federal agencies that would have a stake in their execution. The authors of the draft rule found themselves pressured by proposals from various agencies to define value in conflicting ways. For instance, the U.S. Fish and Wildlife Service (FWS) insisted that value be simply defined with price. The FWS took this position because their representative believed that by doing so he could drive a controversial wedge into the proceedings and thus elevate the discussion to a higher political level, where he might have more influence. That is, he perceived that fixing and determining the meaning of value was a way to shake the foundation on which his political opponents were attempting to erect a framework of environmental governance. Rule authors, however, were determined to retain control of the debate by retaining control of the definition of value. The FWS representative was nonplussed to hear from the rule authors that the concept of value did not merit definition because it was a holdover from earlier regulatory language:

Department of Interior representative (incredulously): So, “value” has become archaic in the past three years?

U.S. Army Corps of Engineers representative: Yeah, basically.5

The National Marine Fisheries Service (NFMS) strongly objected to the FWS’s proposal to formally define value as price; they saw it as an attempt to monetize NMFS-regulated wetlands and thus restrict the kinds of management activities that could be justified to those that were economically rational. Note that a suite of downstream measurement and management activities flow from the definition of value, and the agency that could define value could set the terms for an enormous number of future debates. In a compromise, the White House Office of Management and Budget (OMB) drafted the definition for value (cited at the outset of this article) that, by providing for multiple meanings, did not offend the NFMS.

By mid-March 2006, the draft rule had been finalized and was issued for public comment. Encouraged by the OMB’s interest in defining the term, the word value now appeared forty times and stood alone throughout the text to refer to a broad range of phenomena (e.g., “biodiversity” is a “value”: U.S. Army Corps of Engineers and EPA 2006, 15522). The preamble to the proposed rule exemplified this expansive approach: “values . . . are often dependent on proximity to population centers. Replacing aquatic resources at more remote locations may enhance some values (e.g., preservation of species) while decreasing others (e.g., recreational enjoyment)” (15523). Where, earlier, value had huddled together with functions and services, by the time of the release of the proposed rule value was now an independent and fundamental signifier, seemingly capable of measuring any quality of nature.

The frequent presence of value in the rule and its expansive definition were noticed during the public comment phase of the rulemaking. Commentators from the regulatory world saw the breadth of the definition as a mechanism by which they could broaden their mandate. In their comment letter, the Association of State Wetland Managers, a coalition of state-level wetland regulators, argued in favor of what they saw as the authorization of regulatory power to protect value:

It is sometimes argued that values should not be considered because it is difficult to quantitatively evaluate values. But, a variety of procedures are available to regulators to help determine value . . . even if a rigorous, quantitative evaluation is not possible. (Christie 2006, 6)

The businesses and organizations that are regulated by the Clean Water Act, however, were wary of any broadly specified value. The Utility Water Act Group (UWAG), a lobbying group representing water utilities, struck firmly against any usage of the term:

[S]ince there are no field-tested and verified methodologies generally accepted by regulators for assessing either aquatic resource “services” or “values,” there is no practical metric for applying these concepts to actual impact and mitigation sites. . . . The agencies should delete the definitions of “services” and “values” and strike any references to these terms throughout the proposed rule. . . . The concepts of use and non-use values . . . which are highly controversial, are quite subjective in nature and usually require human surveys about people’s attitudes toward the lost resource. (UWAG 2006, 13)

The UWAG thus argues that there is no agreement on the definition of value, and even if there were it would be time-consuming and very expensive to measure. This is critical for the UWAG because their members will be required to create or purchase wetland credits. If value is defined as loosely as the proposed rule provides, without any credible metrics for its quantification, how can a wetland credit be defined and transacted with certainty? Rather than try to settle the debate in their
favor, the UWAG promotes the status quo in which value is implicitly defined as utility and in practice remains unobserved (see later).

As the drafting of the final rule began in May 2007, U.S. Army Corps of Engineers and EPA representatives incorporated public comments in crafting the final text. In staff-level editing meetings, they found themselves uneasy: The pervasive use of value suggested that the assessment of environmental compensation might be freed from ecological concepts and rooted instead in subjective or economic concepts. This unease was partly due to their commitment to ecological principles of environmental management but mainly because the term value would not provide a firm foundation for regulatory action. In taking input from U.S. Army Corps of Engineers and EPA field staff, rule authors heard them protest that the term was "archaic," duplicative of "functions and services," and, ironically, that the concept "added no value."7

The definition was deleted. In the final rule text, value appears only four times. In the summary of responses to public comments, the rule's preamble explains the reason:

The use of the term "services" instead of "values" will provide a more objective means of assessing how impacted aquatic resources and compensatory mitigation projects relate to people. ... The term "value" can have different meanings (e.g., monetary versus nonmonetary values; landowner versus societal values). The valuation of aquatic resources and their functions is a complicated issue, and one that is unnecessary to resolve for this rule. Use of the term "services" will assist in program implementation, since agencies and stakeholders are more likely to reach a common understanding through descriptions of the ecosystem service. (U.S. Army Corps of Engineers and EPA 2008, 19625)

During the final issuance process, the White House made no attempt to reinsert a definition for value, and the final rule was released on 10 April 2008. It is presently law.

Approaches to Value

It is difficult to use the term "value" in relation to land...we therefore avoid the term.

—Blakie and Brookfield (1987, 6)

The relation between value and nature is the subject of a rich literature in geography (cf. Price 1955; Smith 1984; Cronon 1991; Harvey 1996; Fred 1998; Gidwani 2008; Labban 2008; Mann 2009; Johnson 2011; Lans-
To grasp the relations among value, money, and nature in Marx’s theory—a topic that exceeds the limits of this article—we must begin by setting aside a misconception that Marx created something called the labor theory of value in which human labor alone produces wealth, whereas nature is worthless. This is easily disproven by turning to Marx’s texts: It is clear that much of his work on value is a response to the inadequacies of the “labor theory of value” proposed by Ricardo and Smith. Nature is central to Marx’s thought on value: Consider three passages from different periods in his life. In On the Jewish Question, Marx ([1843] 1992, 239) writes, “Money is the universal self-constituted value of all things. It has therefore deprived the entire world—both the world of [humanity] and nature—of its specific value.” In Capital ([1867] 1976, 638), Marx wrote: “capitalist production . . . only develops . . . the social process of production by simultaneously undermining the original sources of all wealth—the soil and the worker.” The opening lines of his critique of the Gotha Program ([1875] 1966, 3) note: “Labor is not the source of all wealth. Nature is just as much the source of use values . . . as is labor, which itself is only the manifestation of a natural force, human labor power.”

How can we square these statements with Marx’s well-known definition of value as socially necessary labor time? The first point to be emphasized is that Marx defines labor (the source of value in his theory) as both social and natural. Marx stresses this in Capital:

Labour is, first of all, a process between man and nature, a process by which man, through his own actions, mediates, regulates and controls the metabolism between himself and nature. He confronts the materials of nature as a force of nature. He sets in motion the natural forces which belong to his own body . . . in order to appropriate the materials of nature in a form adapted to his own needs. ([1867] 1976, 283)

Marx asks that we see commodity production as a process at once social and natural; more precisely, as a process that defies the taxonomy that segregates the social from the natural. His use of “confront” here indicates that the appearance of “the materials of nature as a force of nature” must be examined—and in a fashion that anticipates the contemporary attempts by geographers to think beyond the social—natural distinction. Both labor and the “nature” that labor “confronts” should be conceptualized here as material processes and their mutual confrontation as exchange (or metabolism, Stoffwechsel). These material exchanges are rendered as social abstractions through social processes specific to capitalism.

There is much more to say on this, but three key points should be clear. First, the human–environment relation is fundamental to Marx’s concept of capitalism. Second, for Marx, nature is a source of wealth, provides use values, and is necessary to the creation of commodities. And third, labor power, which creates value in a capitalist economy, is itself a metabolic relation between nature and society: not a thing but a socionatural relation. These points should not lead us to conclude that Marx therefore believed that nature has value, which is too simple. Rather, his value theory asks us to grasp how it is that things come to be understood as bearing value—how, for example, we come to believe that nature provides us with services that have value to be measured by price (money). To appreciate this last point will require us to take a brief side-step, for Marx’s theory of value emerged through his criticism of earlier political economists.13

### From Smith and Ricardo to Bailey (and Back to Marx)

Marx’s value theory in Capital owes much to his study of Bailey’s critique of Ricardo’s labor theory of value14:

The “Marxian turn” [i.e., the point of Marx’s central discovery] . . . occurred in his middle career, in the shift from Grundrisse . . . to Capital: it was the introduction of “value form.” What provoked Marx’s radical turn, which came after he finished writing Grundrisse, was his initiation to skepticism: it was Bailey’s critique of Ricardo’s theory of value. (Karatani 2005, 5)

Bailey’s critique of Ricardo is elaborated in his “critical dissertation on the nature of value” (Bailey 1825), where he criticizes political economists for using a wrong-headed labor theory of value. Bailey contended that “writers on political economy have generally contented themselves with a short definition of the term value, and have then proceeded to employ the word with various degrees of laxity” (v). Bailey’s key insight is to insist on the relationality of value: “value denotes . . . nothing positive or intrinsic, but merely the relation in which two objects stand to each other as exchangeable commodities” (4–5). He criticized Ricardo for fetishizing labor when defining value. Value, Bailey said, is like distance in a Cartesian world: “A thing cannot be valuable in itself without reference to another thing, any more than a thing can be distant in itself without reference to another thing” (5).15 In effect,
Bailey argued that there was no such thing as value—only exchange-value. Thus, Bailey was a proto-marginalist, and orthodox economists since Bailey have largely reproduced his conception of value.

Marx was fascinated with Bailey's arguments, and in Marx's critique of Bailey we can see his encounter with the marginalist concepts that drive modern economics. Marx saw Bailey's conception of the relationality of value as a fundamental critique of Smith and Ricardo's labor theory of value. Marx, however, saw that Bailey only switched his fetish from labor to relationality. Bailey argued that there was no such thing as value: value—only exchange-value. Thus, Bailey was a proto-marginalist, and orthodox economists since Bailey have largely reproduced his conception of value.

Marx thus stands between Ricardo and Bailey, criticizing both. In Capital, Marx ([1867] 1976, 141, note 17). Marx thus stands between Ricardo and Bailey, criticizing both. In Capital, Marx ([1867] 1976) summarized one of the crucial points differentiating him from these political economists:

"[O]ne of the chief failings of classical political economy [is] that it has never succeeded, by means of its analysis of commodities . . . in discovering the form of value which in fact turns value into exchange-value. (174, note 34)"

Why does this form have to be "discovered"? To Marx, the form that value assumes today is not transhistorical but emerges historically with the development of capitalism. One of the things that distinguishes capitalism is the way that labor is subsumed to commodity production for the accumulation of capital. Remember that, for Marx, all labor is social and natural: For Marx labor is a process by which humans productively mediate the metabolism between ourselves and the world. We could translate Marx's argument into the contemporary terms of geography by saying that under capitalism, complex forms of life (or social natures) are reorganized for the sake of the production of commodities and the accumulation of capital. The crucial point, as elegantly summarized by economist Rubin (1972 [1928]), is that the very structure of capitalist social relations thus leads our productive and exchange relations to be expressed in terms of value:

The usual short formulation of [Marx's] theory holds that the value of the commodity depends on the quantity of labor socially necessary for its production; or, in a general formulation, that labor is hidden behind, or contained in, value: value = “materialized” labor. It is more accurate to express the theory of value inversely: in the commodity-capitalist economy, production . . . relations among people necessarily acquire the form of the value of things, and can appear only in this material form; social labor can only be expressed in value. Here the point of departure for research is . . . not the transactions of market exchange as such, but the production structure of the commodity society, the totality of production relations among people. The transactions of market exchange are then the necessary consequences of the internal structure of the society; they are one of the aspects of the social process of production. (Rubin 1972 [1928], preface to Part II)

After this encounter with Bailey, Marx sees that something has capitalist value in the very condition of being exchangeable, a condition that can only be brought about by the application of labor power. In sum, for Marx, value is a relational system that compels us to treat everything, even other people (as labor power), as a means to an end in a world of commodities.

Although it is beyond the scope of this article to develop this argument in full (but see Rubin 1972 [1928]; Harvey 1982; Foster 2000; Karatani 2003; Heinrich 2012), we contend that Marx's theory of value provides political ecologists with a robust means to conceptualize what we conventionally call the value of nature. From it flow the foundations of critical approaches to human–environment geography: that the strict boundaries between nature and society are fictitious (and can in fact be understood as a consequence of the imposition of a capitalist value form); that the world and living labor produce wealth and value in ways that that cannot be adequately captured in money price; and finally, that the accumulation drive, inherent to capital, transforms sociocultural relations.17 It is when human societies become capitalist—thus transforming our metabolism with the world—that we could be sufficiently alienated from nature so as to assign it monetary value and perceive it as a distinct font of value. Crucially for our purposes in this article, Marx's approach explains why this value of nature, however conceptualized, must increasingly congeal in the commodity form, where value is expressed as exchange value (money).

The Reprise: Value in Nature

The pervasiveness of neoclassical economics, especially following the mathematization of its core theorems, would seem to have put to rest debates over the nature of value. Indeed, it is difficult to get a degree in economics in the United States without accepting
its prevailing conception of utility-maximizing rational individual actors interacting through markets to set prices. In such a world there is no need to speak of value at all—only price. Yet debates about value have returned in ways that directly repeat arguments from the nineteenth century and that flow directly into the discussions surrounding the value of ecosystem services. We examine these debates, following their arc through three rounds.

Round I: Emergy

The literature in environmental economics has provided a forum for debating value since the germinal debates on the proper valuation of nonmarketed public goods in the late 1960s (Dales 1968; Kneese 1971). Driven initially by policy research at nonprofit think tanks like Resources For the Future, and the procedural directives of federal environmental rules and legislation, the subdiscipline of environmental economics addresses the knotted problem of quantifying the value (as price) of the environment as one of its central themes (Georgescu-Roegen 1971; Kneese 1971; Tietenberg 1985; Oates 2006). Some of these economists found that they had to reject the prevailing utility theory of value. They held that the environment consists of a special life-supporting class of public goods and that market price (based on the utility of nature’s services to consumers) must be abandoned as a meaningful metric of value. If these elements of nature are to have a value, it must be found elsewhere: in Newtonian physics, the laws of thermodynamics, and the careful scientific measure of ecosystem flows.

This approach was particularly well articulated in the work of the Odum brothers, who insisted that because environmental phenomena are composed of measureable stocks of material and flows of energy that ultimately originate in the sun, that each element of the environment can be measured in terms of its embodied solar energy. The value term they proposed in 1983, emergy, was meant to be a scientific measure of the value of any given environmental feature, one that would not be swayed by the vagaries of subjective human desire (H. T. Odum and Odum 2000). What, for instance, gives wetland ecosystems value? For the Odums it is the energetic and material flows that constitute the wetland as such: “It is not human beings and their money that determine what is important; it is all the world’s energy” (Odam and Odam 1976, quoted in Shabman and Batie 1978, 234). This is a materialism of the first order—although one lacking historical and political-economic perspective.

By staking this position—which to this day continues to provoke the expenditure of millions of federal grant dollars—the Odums essentially repeat Ricardo in an ecological register. Like Ricardo, they treat value as something inherent in physical things, emerging from a unique process that makes these things what they are: human labor for Ricardo, nature’s productivity for the Odums.

Some economists, adopting a position anticipated by Bailey’s critique of Ricardo, harshly criticized the Odums’ theory of value as naïve, because it was totally unrelated to market price. Shabman and Batie (1977, 7) argued, “To imply that ‘prices are ultimately determined by energy’ does an injustice to economic science.” This is because equating value with energy “would be unworkable. Markets would not clear; investment, resource allocation, and other decisions would be distorted; and real income would be suboptimized” (Huettner 1976, quoted in Shabman and Batie 1978, 237). The Odums’ theory of value was rejected by mainstream economists because of their failure to adhere to the axiom: The nature of value is foundational and cannot be debated.

Before we turn to the second round of this debate, a word on the legacies of the first is in order. The Odum–Shabman debate of the 1970s was no mere intellectual sideshow but reflects the teething pains of ecological economics during a period when it became a conventional subdiscipline. Although the Odums lost the debate in the eyes of most environmental economists, emergy remains a concept that animates some economists and even federal policymakers, who hope that it might provide a distinct conception of the value of nature (Reppert et al. 1979; H. T. Odum and Odam 2000; Cambell, Brandt-Williams, and Meisch 2005; Mack 2006).

Round II: Ecosystem Services

Over the past decade, debates over the value of nature have taken place increasingly under the rubric of ecosystem services: the enumerated, often privatized, occasionally commoditized goods and services that ecosystems provide to humans in fulfillment of their utility. Academic ecologists—many heeding the directives of the United Nations Millennium Ecosystem Assessment and the more general Millennium Development Goals—search for reliable and reproducible ways to create ecological model outputs that will...
serve as the inputs to economic models (as explicitly called for in National Research Council 2006). This has been analyzed in many settings (see Heynen et al. 2007) as a neoliberal project in search of the market-clearing price with which to value nature: “[A]lthough ecosystem valuation is certainly difficult and fraught with uncertainties, one choice we do not have is whether or not to do it” (Costanza et al. 1997).

Finding the value of ecosystem services can be understood as a simple issue of discovering the price of those elements of nature that provide rent or serve as capital or commercial goods and services. Yet the term value persists in the ecosystem services policy literature, its usage clearly related to, but not synonymous with, price. Ecosystem service enthusiasts frequently adopt definitions of value that strict neoclassical economists consider at best “loose” and at worst “muddy” (Boyd and Banzhaf 2007, 1). One common practice in this literature is to avoid defining value by simply listing numerous examples of ecosystem services (cf. Daily and Ellison 2002; MEA 2005), as if value is itself invisible but self-evident in the cornucopia of nature. As a result of Bailey’s success, value is not directly observable to the modern economist. The value of nature is simply presumed to be evident in the basket of items that can be priced; thus economists Woodward and Wui (2001, 258) were able to write:

We maintain an assumption that there exists an unobserved valuation function that determines a wetland’s value given its physical, economic and geographic characteristics.

This is a pure expression of a Baileyan world, one where value is conceived as immaterial, purely relational, and expressed strictly through market transactions.

Yet although many policy analysts see ecosystem services as a cornucopia of new policy tools and potential markets, the hackles of more analytical economists are raised. They reason that an ecosystem service should meet the same criteria as any other commodity: It must be an identifiable and consumable end product. To them, qualities like denitrification and hydrologic storage are only functions that might lead to final products like clean water and flood reduction. Although everyone in this debate agrees that the measure of value is price, participants are drawn (sometimes reluctantly) to this question: What is the substance of nature that must be expressed in money terms? Boyd, a Resources for the Future scholar, here plays the Ricardian materialist against Baileyan skepticism about value’s substance: “While environmental economics has grappled for decades with the challenge of missing prices for environmental amenities, it largely has neglected the other central issue: the consistent definition of the environmental units to which value can be attached” (Boyd and Banzhaf 2007, 4).

At the level of policy debate, we remain within Round II. To provide a critical perspective, and to properly recapitulate the original Bailey–Ricardo debate, the voice of Marx must enter. What might it mean for Marx’s ideas to open a new round of thinking value and nature?

Round III: Marxian Returns

Marx saw that value is distinct from both the physical body of a commodity and its measure (exchange value). Even as Marx accepted Bailey’s critique of Ricardo concerning the measure of value, he concluded that the substance of value existed and was constituted not by physical caloric expenditure but by socially necessary labor time organized as an exchangeable commodity (abstracted from the totality of our socio-natural lives). What might be the parallel critical insight in modern debates over the value of nature? It is, we contend, to recognize that components of the environment might only become commodities because of the expansion of capitalist relations and that, specifically, environmental services can only come to be commodities through the same social process of abstraction that Marx observed. In this view, an ecosystem service qua commodity emerges, like every other commodity, through a particular metabolic process involving exchange between living labor and the world. As Karatani (2003) explained:

Land and labor are the very things that capital cannot produce, although [capital must rely] on them, even lives off them. But still the crux is that all products, whether man-made or natural, are organized [today] by value-form, and [Marx showed that] both physiocrats and classical economists [like Ricardo] disregarded this dimension. They considered value production and object production as one and the same thing. (332)

Marx’s approach thus allows us to analytically distinguish the value of nature from the price of resources, as well as from the measurement practices of ecologists and economists that have proven so crucial in creating commodities in nature. It also allows us to answer an important question, namely, why is it that nature is becoming everywhere more “organized by value-form”?

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Geographers are well positioned to critically develop this analysis, first spelled out in detail by Marx in the Grundrisse ([1857] 1973, 409–10):

... [Capitalist production] creates... a system of general utility... while there appears nothing higher in itself, nothing legitimate for itself, outside this circle of social production and exchange. Thus capital creates the bourgeois society, and the universal appropriation of nature as well as of the social bond itself by the members of society. ... For the first time, nature becomes purely an object for humankind, purely a matter of utility; ceases to be recognized as a power for itself. ... Capital drives beyond national barriers and prejudices as much as beyond nature worship, as well all traditional. ... Encrusted satisfactions of present needs, and reproductions of old ways of life. It is destructive of all this, and constantly revolutionizes it, tearing down all the barriers which hem in the development of the forces of production.

These relations are increasingly mediated by the capitalist state, to which we now turn.

The State and Value

We have seen state functionaries attempting to steer the government by arguing about the definition of value. We have seen that Marx, Bailey, the Odums, and a host of modern economists treat value's definition as key to providing the conditions for capitalist expansion. And we have seen both economists and governments refuse to perceive or define the substance of value. Here we end our analysis with a consideration of the state's problem with value: Why did the value of nature appear so important to the state in the development of market regulations yet also so impossible to grasp or define? Why is such an apparently difficult and problematical concept so irrepressible? First, a brief statement on the state is necessary. Without attempting to elaborate a full-fledged vision of state action, we can say that we adopt Jessop's (1990) strategic-relational view of the state (inspired by Marx and rooted in the argument that "the value-form is the fundamental social relation that defines the matrix of capitalist development"; Jessop 1990, 197). Jessop argued that the capitalist state is the product of efforts by distinct class fractions to resolve the contradictory, crisis tendencies of capitalism, and is not merely the instrument of capital. His approach leads us to appreciate the capitalist state not as a thing but as a social relation; not as a coherent agent unified around a simple project of expanding capital but as a stage on which struggles over capital accumulation play out. These struggles often play out around property law and institutions of market governance—such as Section 404 of the Clean Water Act. The work of the state to resolve the contradictions of capital often requires that it call on information from outside capital—from science and law, in particular—and some translation is required between the different logics that inform these three realms of knowledge, translation performed by the people who work in state offices (see Robertson 2012). Thus, today the state—at least the U.S. state—requires not only economic evaluations and market data in deploying almost any regulatory strategy, but it also requires testimony from scientists concerning the quality of our air and water. Disagreements on the substance and measure of value are to be expected in this process and can either be resolved or elided by the state.

Before and during the circulation of the draft rule, resistance to the fixing of value in a definition was founded on objections that it would either expand state power relative to the private sector (the UWAG's concern) or restrict state power relative to market forces (the NMFS's concern). These are not uncommon objections in government. But we note that the way in which the rule would expand or restrict power is by assessing the value of objects or outcomes. Consider these two objections again: The UWAG claimed that "The concepts of use and non-use values... which are highly controversial, are quite subjective in nature," whereas the NMFS argued that price valuation was inconsistent with their mission as a state agency. Their concern was not with negative outcomes per se but with loss of control over the terms of object identification and assessment; in other words, the substance and measure of value.

The state in question is not a generic state but a capitalist one. That means that it must work to ensure accumulation. But the state cannot eradicate noncapitalist concepts of value without establishing the complete determination of the entirety of the governed society (including the state itself) by capital. Capital could not survive this any more than could the state. So the state's task in this case is to thread a relatively fine needle: to ensure that the capitalist value form expands but prevent it from becoming the sole means of determining the identification of objects and the measurement of their qualities. Given such a task, the expected outcome is the one actually seen: The state refuses to define value. This ambiguity and silence allows the state to continue to call on noncapitalist knowledge and resources to express nature in capitalist value form.
Conclusion

Like the return of the repressed, the concept of value continues to haunt talk of the environment in Washington, DC. This little, indefinite keyword seems indispensable: an absent referent holding the discourse on environmental governance together. In the halls of state institutions, talk of value signals something more, an ineffable quality—something monetizable, yet not itself money. Could it be some substance—like emergy—that inheres in wetlands and nature themselves?

Our answer is no. Value is not a substance to be found in nature, the human body, energy, or anywhere else. On this point, Bailey was right: Value is essentially relational. But Bailey’s analysis stopped with the individual and his or her thoughts about esteem, and as Marx showed, Bailey could not explain the social quality of value’s relationship to capitalism (or money). Marx indicates the need to go beyond throwing up our hands at the hopelessness of capturing value in some transcendental form, or of waging rearguard actions against the expansion of capitalist value form. His work points to the need for a theory of value to demonstrate the underlying phenomenon: In capitalist society the attempt is made to place everything, even our relation to the natural world, in the value form native to capital. This attempt, however, can never be completed, and Marx’s theory of value also draws our attention to the fact that a social form of value could exist in which the wealth of our relationship with the natural world is not reduced to exchange value.

Although Marx’s value theory is completely distinct from the ethos surrounding environmental policy in the United States today, the term value has become necessary as an indication of something to be measured and preserved within the regulated calculus of capitalist exchange. This extension of capitalist social relations into new arenas often called neoliberalism—the pursuit of new opportunities for the expansion and accumulation of capital (Peet 1975; Harvey 1982)—requires the state to stimulate the creation of new institutions, practices, and even abstractions, for the existence and proper functioning of such markets. Capitalist states must facilitate the measure of new values because they are necessarily involved in the regulation of capitalism’s transformation of the natural environment. Every capitalist state is involved, in various ways, with the regulation of capitalism; today, the regulation of environmental transformation is a core part of these regulations. To make sense of these regulations within capitalist society, some concept like value seems necessary: Nature must have some substance that can be measured as an abstraction to allow market exchange. How else can a state measure—or calibrate the measurement of—its investments, regulations, and effects? The state requires some calculus of nature that supersedes and overcomes the specificities of price and ecology.

Yet there is no transcendental value, there is only a struggle over the terms of substance and measure, unique to each historical moment. This is why, on the very first page of Capital, Marx urges his readers to pay close attention to “the invention of socially recognized standards of measurement for the quantities of . . . useful objects” ([1857] 1973, 125). If geographers cede this arena—what Mann (2009) refers to as “the politics of measure”—without contest, we lose sight of an important analytical and political lever. Such a lever is what UWAG used in claiming that “there is no practical metric.” In contesting measure, we challenge the logic by which something becomes a bearer of value in capitalist society; that is, becomes capable of circulating as a means to an end. If we move downstream of this moment and only track the circulations and chart the injustices and absurdities that result, we have missed the headwaters of analysis and political change.

Specifically, there are three reasons why the value of nature must be addressed in any account of the transformation of the environment under capitalism. The first is the simplest. To do so reminds us that price is not the same as value. The price of a given commodity in a capitalist economy is only its exchange value expressed as money.

Second, it gives us new leverage in understanding the effort to save nature by putting a price on it. The tribune of environmental economics defines the Earth as “a highly-efficient, least cost provider of human life-support services” (Costanza et al. 1997, 255). Science declares that “ecosystems are capital assets” (Daily et al. 2000, 395) axiomatically, as if this were simply an empirical description of the world. Yet it is only in a world already seen to be composed of commodities that such a claim makes sense, and this condition is only achieved through the expansion of the capitalist value form, mediated more or less successfully by the capitalist state. The coming years will see a massive increase in the capacity of both states and markets to calculate value in nature using an abundant array of algorithms, ecological assessment methods, and market mechanisms (smartphone applications already exist for such purposes). This maneuver’s successes—and, perhaps more important, its failures—must seem cryptic or novel
unless we understand the nature of capitalist value and the role of the capitalist state in ensuring its expansion. We must be clear, in other words, on what is being calculated in such policies and markets. If we believe that it is merely price, we are making mistakes that have been made before.

Third, focusing on value form allows geographers to draw on Marx's analysis, which provides a uniquely powerful basis for seeing the interconnections between ecological change and class relations. In making this claim, we affirm our desire for political ecology to build on its Marxian heritage. The Baileyan way of thinking about value seems to have a strong hold on geographers, however. It should be clear from the preceding analysis of Marxian and mainstream economic conceptions of value that the Baileyan/neoclassical theory of value is actually a theory only of its measure, not of its substance or its form. The Ricardian way of thinking, in which nature in its physical self is the repository of value, is also represented today. These two old combatants resurface in various incarnations but only to spar axiomatically and with unproductive results.

In retrospect, we can appreciate Blaikie and Brookfield's (1987) reticence to take on value in their important early work. To take a step away from Marx's value theory might have been a practical necessity for their project (in which a structural Marxist hoped to benefit from the instincts of a behavioral anthropologist to understand environmental change). But the time for bracketing value is over. It prevents us from critically analyzing the process by which, to paraphrase Marx, the nature of societies in which the capitalist mode of production prevails converts our world into an immense collection of commodities.

Coda: Geography and Value Redux

Some of the arguments in this article have been made before. In 1973, geographer Dick Walker published an astonishing essay in the now-defunct Coastal Zone Management Journal—a paper that would be largely forgotten. Walker critiqued the (then-novel) reimagining of wetlands as economically valuable resources, combining a careful appreciation for ecological science with a determination to unearth the conflicts underlying the “value of wetlands” invoked by scientists and environmentalists alike. His article first provided a summary of the state of the science in wetland ecology and then moved toward the political questions involved in assessing value. Walker’s appeal for the recognition of complexity in the “translation of detritus into dollars” was met with a response of hardheaded rationalism by two ecologists, who righteously affirm their “Scientific Proof for the Value of Wetlands” in a rebuttal (W. E. Odum and Skjei 1974). Walker (1974) responded:

What I question is not the value of wetlands preservation, but rather the validity of the ecologists’ method of determining that value. This brings us head-to-head with two fundamental issues: (1) how “value” is defined, and (2) by what means that “value” is demonstrated in practice. ... Economists have grappled with the relationship between exchange value and several kinds of subjective “use” values since the time of Adam Smith. [Ecologists like] Odum and Skjei claim full awareness of the problem of use- versus exchange-value, but continue to use the word “value” loosely... as if its meaning were self-evident. ... This ambiguity between embracing the market and rejecting it is a recurrent theme in the literature of political ecology. (Walker 1974, 228–29)

Almost forty years on, this ambiguity remains a recurrent theme in the literature on political ecology. And reading his essay today, we find an approach that anticipates, through the lens of value theory, debates and insights from the several decades of nature–society work in geography that followed. Walker's pioneering paper reminds us that—although it might seem “so obvious that one almost apologizes for saying it” (Walker 1973, 93)—the metabolism of society and nature in a capitalist society cannot be understood without addressing value. This is a lesson worth remembering.

Acknowledgments

We would like to acknowledge the helpful criticism of our anonymous reviewers, as well as the generous contributions of commentators at the 2008 meeting of the Association of American Geographers, where we first presented these arguments publically. All mistakes remain the authors’ own.

Notes

1. The National Defense Authorization Act for FY 2004 directed the U.S. Army Corps of Engineers to develop regulations ensuring that equivalent standards be applied to all forms of compensatory mitigation required by permits issued by the Corps under Section 404 of the Clean Water Act. Such mitigation sites replace the functions and area lost when wetlands are destroyed by a permittee. This was an attempt to apply the rigorous standards by which entrepreneurial wetland banking was regulated to the other forms of compensatory mitigation, thus
eliminating a competitive disadvantage that entrepreneurial bankers had complained about since their emergence as a significant lobbying force in wetland policy. As this was a modification of Clean Water Act regulation, the U.S. Environmental Protection Agency was required to be a coauthor. Initial drafting of rule text began in April 2004; the EPA joined as a coauthor in February 2005; the Proposed Rule was issued 28 March 2006 (U.S. Army Corps of Engineers and EPA 2006); the public comment period lasted from April until June 2006; and the Final Rule was issued on 8 April 2008 (U.S. Army Corps of Engineers and EPA 2008).

2. Numerous geographers have written critically about the new markets in environmental services. See, for instance, Mansfield (2008), McAfee and Shapiro (2010), and Corbera, Brown, and Adger (2007).


4. Although the FWS representative was, like everyone else at the table, a part of the second Bush Administration, interagency disagreements and outright struggles are common within any administration, and the FWS is occasionally at odds with the U.S. Army Corps of Engineers and EPA over points of budget or regulation. The White House Office of Management and Budget is empowered to officiate such disputes.

5. Interagency meeting, 20 February 2006.

6. Regulations containing imprecise concepts are frequently targets of successful lawsuits. Regulators will frequently fail to act on ambiguous guidance rather than risk legal trouble.

7. Confidential personal communication, 15 October 2006.

8. Peet, Robbins, and Watts (2011) carried an entry for “value creation,” which led to the chapter by Johnson (2011). Johnson's chapter has many virtues but it does not invalidate our generalization about the literature.


10. Or, in one or two cases, to attempt to write a post-Marxist value theory of nature. For instance, Cronon (1991, 149), called for a “natural theory of value,” invoking the power of ecosystems to create value by harnessing solar energy, claiming that “the labor theory of value cannot by itself explain the astonishing accumulation of capital that accompanied Chicago's growth” (149), and “much of the capital that made [Chicago] was nature's own” (151). His claim that value has a dual source in both human labor (which is social) and in ecosystems (i.e., nature) reintroduces a schism that political ecology has long aimed to overcome. Yet, to our knowledge, no geographer has answered his critique. (Note that Cronon applied arguments originally formulated by ecologists—discussed in section II.)

11. It is a common error to describe Marx's value theory as “the labor theory of value” (as, e.g., in Soja’s [1980] critique of Harvey in the Annals). For many it seems to mean little more than the idea that human labor = value and value = human labor. Such a view lies closer to Smith and Ricardo than Marx. Unfortunately, this misunderstanding seems widespread. Hence, we find writers correcting Marx for his failure to see that nature is necessary for commodity production (see previous note). Marx, of course, knew this. Other writers suggest that Marx contradicts himself: “commodities have value . . . because they embody alienated labor. Going beyond his labor theory of value, Marx . . . [later] admits nature as a source of value” (Ribot and Peluso 2003, 156). The confusion here stems from the notion that Marx has a labor theory of value to begin with. The most thoughtful critique of Marx's value theory on the grounds that it is anthropocentric is to be found in Brennan (2000); we do not accept Brennan's critique but we find much to agree with in it.

12. Compare: “Only the products of mutually independent acts of labor . . . can confront each other as commodities” (Marx [1867] 1976, 132).

13. This transformation is effected in Marx's economic notebooks from 1861 to 1863 (published as Theories of Surplus Value in three volumes) and Capital.

14. In this we are following Karatani's (2005) path-breaking reconsideration of Marx's intellectual evolution. See also Karatani and Wainwright (2012, 31–33).

15. Marx's contribution might be understood by considering that the Oxford English Dictionary says that value means the “adequate equivalent” between two things but might again also refer to the very “standard of estimation of exchange.” Bailey emphasized the former (value as relation, or adequate equivalent), but he began his essay by treating value as esteem. Thus, esteem acts as the implied standard of estimation of exchange. For Marx this will not do. In effect, his critique undermines Bailey's transhistorical category esteem and notion of relation—which are not explained by Bailey—with socially necessary labor time. See Marx ([1867] 1976, 137–38, note 16).


17. There is a widespread “Polanyian” way of thinking about value in nature among geographers today (Polanyi 1944). In this view, nature and human labor are merely “fictitious commodities,” and it is this that makes their incorporation into capitalist production perilous. Although sympathetic to this argument, we feel that Marx's value theory goes much further. For one thing, land and labor power are commodities; although their markets are imperfect, they are bought and sold every day. What Polanyi refers to as “fictitious commodities” are merely those whose physical form is not manufactured, although, like all commodities, their value is constituted as socially necessary labor time. The distinction between what Polanyi calls fictitious commodities and all other commodities is invidious because it commits us to a belief in two sorts of value in capitalism—one created through labor power, the other inherent in nature—which then commits us to an untenable ontological position in which nature is irreducibly different from humanity.

18. Anyone who doubts the currency and importance of the concept of emergy will be quickly disabused of the notion by performing a Google search for “EPA” and “emergy.” Emergy evaluations are now a routine part of EPA environmental assessment procedures across the spectrum of program offices. The concept is routinely forwarded, just as originally intended by the Odums, as a nonmonetary alternative to valuation in policy assessment, which is
particularly useful in situations where monetary assessment is politically sensitive.

19. We are not the first to notice the Ricardian basis of ecological economics; see Judson (1989).

20. At a higher level of abstraction, this argument is derived from the underlying philosophy of mainstream economics. As Mitchell (1998) observed, “the central concept of economics, individual utility, was modeled directly on the new idea of energy. It represented the same unique, protean, unknowable force, giving the elements of the economic field their animation” (86).

21. In a lecture, Shabman (1989) reflected back on his debate with the Odums as a hollow victory:

I have often asked myself “what was the hostility about” and “why?” I now am certain that the hostility arose because the biologists were seeking to define what the money values should be for wetlands, while the economists were asking what the money values actually were. Who won? Well, economists have won the intellectual battle over what money value means and most wetland scientists better understand what money values do and do not measure. In fact, we were so successful that many of these people decided that economic valuation was of little relevance to developing a wetlands policy! The wetlands preservation community, recognizing that economists’ values would not serve the symbolic value they sought in their drive for preservation, went their own way.

22. “[N]o chemist has ever discovered exchange-value either in a pearl or a diamond” (Marx [1867] 1976, 177).

23. A fuller analysis here would require a critical theory of nature vis-à-vis the capitalist state that lies beyond the scope of this article (see Jessop 1990). Within the U.S. state institutions where the debate over nature’s value is unfolding, of course, the implicit conception of the state is uncritically liberal-pluralistic. Although understandable, this is analytically insufficient. A critical state theory must examine how the state employs the abstraction value, even as that flexibility obstructs and frustrates individual state fractions.

24. It was cited only nine times (by 2011), only once since 1980, and in the geography literature but once (by Walker himself).

References


The Value of Nature to the State

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