

CAPITALISM AS WORLD-ECOLOGY

Braudel and Marx on Environmental History

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This essay considers the relevance of Fernand Braudel's world-historical studies for the theory and practice of environmental history. Arguing against the conventional view that Braudel regarded the environment as a backdrop, the essay points to his sophisticated layering of time, space, and nature in which society and ecology actively shape each other. Braudel's greatest historical-geographical insight is the idea that world-economies are not simply social constructions but also ecological projects. In this fashion, Braudel implicitly suggests the concept "world-ecology." Although never spelled out in precisely these terms, the idea that ecogeographical processes permeate the ever-shifting relations of region, state, and world-economy runs like red thread through Braudel's corpus. Braudel understood nature in terms of transitory but identifiable socio-ecological moments that shape and are shaped by a world-ecological whole. Unfortunately, Braudel's underconceptualized approach prevented him from identifying with greater specificity capitalism's world-ecological contradictions. To build effectively upon Braudel's ecohistorical insights, we might turn to Marx and Engels' ecological critique of capitalism.

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Lucien Febvre use to say "history is man." I on the other hand say: "history is man and everything else." Everything is history: soil, climate, geological movements.

—Fernand Braudel (1984b, p. 22,
quoted in Aguirre Rojas, 1992, p. 189)

To discuss civilization is to discuss space, land and its contours, climate, vegetation, animal species, and natural and other advantages. It is also to discuss what humanity has made of these basic conditions: agriculture, stock-breeding, food, shelter, clothing, communications, industry, and so on.

—Fernand Braudel (1993, pp. 9-10)

The explosive growth of environmental studies in recent years has occasioned the environmental rehabilitation of a wide range of social critics, theorists, and historians, ranging from Karl Marx to Mahatma Gandhi to Helen Keller (Clark & Foster, 2002; Foster, 2000; Guha, 1995). Curiously, Fernand Braudel remains unexamined. To be sure, environmental historians are aware of Braudel. But they do not quite know what to do with him. William Beinart (2000) sums up the environmental historians' consensus when he observes that Braudel "tended to deploy environ-

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mental factors as a backdrop. . . . He was less successful . . . in examining the human impact on the natural world” (p. 270). The environment—but not environmental history—is what counts in *le monde Braudelien*.

Here be the conventional wisdom. But is it so?

If the conventional view charges Braudel with treating ecology as backdrop, I suggest an alternative reading. The conventional view is not so much entirely mistaken as irremediably partial. In *The Mediterranean and the Mediterranean World in the Age of Philip II* (1972) above all, Braudel offers an account of a “world-economy” at a moment of epochal change in which ecology and society shape one another. This moment marked the end of the “long” 16th century (ca. 1450-1640), an era that saw the rapid expansion of the European world-economy. Its closing decade witnessed the shift of that world-economy’s center of gravity from the Mediterranean to the Atlantic—one of the great historical-geographical transitions in the history of humankind. Far from positing a passive or dualistic relation between nature and society during this momentous transition, Braudel sees an active and dialectical relation between world-economy and what I would call “world-ecology.” Although never spelled out in precisely these terms, the idea that ecogeographical processes permeate the ever-shifting relations of region, state, and world-economy—even the bodies of workers and peasants!—runs like red thread through the *The Mediterranean*. Nature, neither unduly diffuse nor relentlessly specific, is viewed in terms of transitory but identifiable socio-ecological moments that shape and are shaped by the larger world-ecological whole.

At its best, Braudel’s contribution to environmental history—above all, to the emergent field of world environmental history (Moore, 2003b, in press)—goes beyond a broad recognition that “nature matters.” Braudel’s greatest historical-geographical insight is that world-economies and world-ecologies are dialectically bound, variously constraining and enabling at different moments and on different scales. Sociophysical geographies are always at play in historical systems. Any reduction of these geographies to simple context treats nature “as if the flowers did not come back every spring, the flocks of sheep migrate every year, or the ships sail on a real sea that changes with the seasons” (Braudel, 1972, p. 20). This recognition of ecological dynamism is enriched and made distinctive by Braudel’s understanding that social agencies not only exist in but actively produce socio-ecological space.

And yet, for all its virtues, the very conceptual eclecticism that so enriched the analysis and allowed Braudel to escape his era’s prevailing orthodoxies ultimately hid from view the precise character of the dialectic between world-economy and world-ecology. On the one hand, Braudel’s is a remarkably prefigurative ecohistorical geography. He combines a sophisticated, multilayered treatment of historical time with a dynamic conception of town and country on multiple geographical scales. Through these rich descriptions, Braudel offers fresh ways of conceptualizing the overarching *problematique* of world environmental history: the relation between land, labor, and the world-system. On the other hand, empirical richness is frequently achieved at the expense of “consistent explanations” for “patterns of recurrence and evolution” (Arrighi, 2001, p. 120). Nowhere is this more evident or more costly than in Braudel’s neglect of the labor process as the socio-ecological integument between nature and society. Sometimes Braudel recognizes labor, and sometimes he does not. The upshot? His articulation of the world-economy/world-ecology relation wavers between a dialectical tension, in which the ecological moment of social power and economic development moves to

center stage, and a dualistic treatment that reduces the environment to the status of backdrop.

In the pages that follow, I consider Braudel's contribution to world environmental history from three points of departure. First, I assess time, space, and nature in *The Mediterranean and the Mediterranean World in the Age of Philip II* (1972). Next, I consider Braudel's handling of agronomic choice and the trajectories of Europe's wheat-based and China's rice-based civilizations. Third, I reexamine Braudel's conception of "biological regime" (1981, pp. 70-92; also 1961, p. 255), whereby diets, and therefore bodies, become articulated with world-historical patterns and changes.

These assessments reveal the richness of Braudel's ecohistorical imagination and practice. But given the explanatory weaknesses of Braudel's provocative linkage of world-economy and world-ecology, we are left wanting more. Braudel points us toward the promised land, but he cannot quite get us there. Where to turn? Immanuel Wallerstein develops Braudel's ecohistorical sensibility most directly, arguing among other things that the rise of capitalism was embedded in and enabled by a fundamental reshaping of "world ecology" (1974, p. 44). Yet Wallerstein's Marxist synthesis of economic history and Braudelian *ecohistoire* is in certain respects not Marxist enough. In particular, whereas Wallerstein pays far more attention to labor than does Braudel—and more than critics have acknowledged—the metabolism of the labor process and its relation to capitalism as a whole remains undertheorized, although not unrecognized. So whereas Wallerstein views nature-society relations as crucial to the rise of capitalism, in certain respects the constitution of capitalism as world-ecology simultaneously from above (the sphere of accumulation) and from below (the point of production) receives short shrift (Moore, 2003b, in press).

Fortunately, Marx's materialism offers a way out. Taking as its fundamental point of departure the struggle between freedom and necessity in socio-ecological relations. Marx puts the labor process and the agency of the direct producers at the center of his perspective on social change (Foster, 2000). In this way, Marx contributes to an activist materialism prefiguring recent conceptions of nature and society as relationally constituted (Braun & Castree, 1998; Moore, 2001). At the same time, in Marx's hands, the labor process is not endowed with supernatural powers but rather conceived as a decisive moment in the broader process of production, in which production, circulation, distribution, and exchange comprise an "organic whole" (Marx, 1973, p. 100; also Tomich, 1997).

From the perspective of environmental history, three aspects of this activist materialism stand out: (a) the notion that nature and society coevolve and mutually constrain, constitute, and enable each other; (b) the idea of a contradiction between capitalism's law of value and the ecological sources of all wealth, land and labor; and (c) Marx's conception of metabolism (*stoffwechsel*) and especially a "metabolic rift" that expresses the ecological moment of capital's town-country antagonism.

THE MEDITERRANEAN: CONSTRUCTING TIME AND SPACE IN ECOHISTORICAL GEOGRAPHY

Braudel's *The Mediterranean* provides some important clues—if not a systematic theoretical framework—for conceptualizing world environmental history. Organized around the historical geographies of structure, conjuncture, and event,

these categories at once signify the mutually relational character of historical time and sociophysical space and allow what he would later call “interspatial and intertemporal comparisons” (1989, p. 21).

We may begin with time.

Although Braudel’s conception of structural time, the *longue duree*, is perhaps his most well-known point of emphasis, his study of the 16th-century Mediterranean is organized around the notion of conjunctural time. Here the goal is to illuminate “the inter-relationship between change and the near-permanent in history” (1972, p. 892)—and, implicitly, to shed light on the relation between the relatively faster moving historical-geographical structures of commerce, politics, and class conflict, and the relatively slower moving structures of the physical landscape, which is at once given and made in Braudel’s view.

For Braudel, the idea of the *conjoncture*—such as the later 16th century (ca. 1550-1640)—refers not

to a conjuncture but rather to either phase (the rising or the declining phase) of a cyclical process, one half, so to speak, of a bell-shaped curve on a chart. . . . It would be more fruitful to translate it therefore as “cyclical history. (Wallerstein, 1991, p. 136)

Where the *longue duree* highlights the “long-term demographic movements, the changing dimensions of states and empires . . . the intensity of industrial growth,” the perspective of the *conjoncture* helps us understand “rates of industrialization (rather than its presence or absence), the fluctuations of state finances, and wars” (Braudel, 1972, p. 899). This choice of emphasis, highlighting the tension between structure and *conjoncture*, allows Braudel to include environmental transformations in this Mediterranean world history. Contrary to environmental critics such as Martinez-Alier (1991), Braudel’s perspective in *The Mediterranean* is not reducible to the *longue duree* but rather pivots on the dialectic of structural and conjunctural time-space. It is the tension between the two that allows Braudel to admit environmental determinations without succumbing to environmental determinism. Whereas the latter privileges the extremely long run, Braudel refuses any static conception of natural history, no less than social history.

Braudel (1972) treats the issue of geographical scale no less skillfully. The Mediterranean world is not “just there.” Rather (prefiguring Wallerstein), it is a “world-economy” bounded by a “geographical division of labor” that is made and remade by social forces over long historical time (p. 387). At the same time, this world-economy was subject to significant transformation during the *conjoncture* of the later 16th century (pp. 18-19). Moreover, recognizing space as no less static than time, in Braudel’s hands, the Mediterranean world-economy is no a priori analytical unit. Even the 16th-century Mediterranean’s slowest moving historical processes—above all, those between man and nature—are not immutable determinations, trotted out at the beginning of the text to establish a certain geographical context. Although in some respects the nature-society relation appears almost timeless, Braudel (1972) strongly criticizes the dominant historiography’s practice of giving

the traditional geographical introduction to history . . . with its descriptions of the mineral deposits, types of agriculture, and typical flora, briefly listed and never mentioned again, as if the flowers did not come back every spring, the flocks of

sheep migrate every year, or the ships sail on a real sea that changes with the seasons. (p. 20)

More abstractly, Braudel (1972) insists that the Mediterranean's spatiotemporal boundaries be questioned and argued. Neither a priori nor static, the Mediterranean world-economy's boundaries expanded in the 15th century with the emergence of a "Mediterranean Atlantic" (including sugar islands such as the Madeiras) (p. 155). Perhaps there was even a "global Mediterranean" (p. 168). Braudel constructs this world-economy in constant dialogue with socio-spatial forces and changes at smaller scales. On the one hand, Braudel emphasizes a certain unity that enables him to draw spatiotemporal boundaries around this world, which he likens to "an electric or magnetic field" (p. 168). On the other hand, he argues that the "Mediterranean is not even a *single* sea." Nor is it "an autonomous world" (pp. 17, 108-109). Weaving back and forth between broad historical patterns and the diversity of everyday life, in Braudel's hands local history is not erased but rather enriched in the effort "to encompass the history of the Mediterranean in its complex totality" (p. 20).

Braudel's (1972) historical geography of the 16th-century Mediterranean is therefore no mere study of social history at a single scale. If the world-economy is the encompassing analytical unit, at least two other scales figure prominently: the nation-state or the so-called *territorial economy*, and the city-state or the so-called *urban economy* (p. 341). At this point another socio-spatial dialectic emerges. The resurgence of the territorial states over the course of the 16th century was not so much about the displacement of urban power as the latter's reorientation. "Cities created by national or imperial units in turn create[d] these units" (p. 351). Urban and territorial economies found themselves dependent on one another. "While the territorial states and empires acquired lands in plenty, they were unable to exploit unaided the resultant huge economic units" (p. 344). Consequently, "The cities remained the driving forces" in the 16th century. "States that included these cities had to come to terms with them and tolerate them" (p. 341). Although cities remained the prime movers in these huge economic units, their territorial power began to wane toward the end of the Middle Ages. By the late 15th century, one witnesses "the years of the collapse of the city-states, too narrowly based to resist the onslaught on the territorial states who were henceforth to play the leading roles" (p. 339). A new socio-spatial order was emerging. The states wielded territorial power and the city-states wielded economic power, and neither could get very far without the other. Although the states had to come to terms with the urban capitalists, "even the most independent cities needed the use of the space belonging to territorial states" (p. 341).

Crosscutting the Mediterranean world-economy's urban-territorial dialectic is Braudel's conception of town-country relations. On a regional scale, the city and its *contado* moves to center stage. This was "the inevitable dialogue between advanced countries [the cities] and underdeveloped regions . . . [between] the sophisticated and the backward" (Braudel, 1972, p. 386). The cities, according to Braudel (1972) depended on and dominated the countryside:

For the towns could not do without these poor regions on their doorsteps (*and which they maintained, deliberately or not, in their poverty*). Every city, no matter how brilliant... had to draw its essential food supplies from an area contained within a radius of about 30 kilometres. (p. 386)²

Genoa excepted, northern Italy's city-states sought to widen and deepen their immediate hinterlands in the 15th century rather than expand overseas. In contrast to Spain and Portugal, "Italy survived by increasing home production" in the 15th and 16th centuries (Braudel, 1972, p. 597). Theirs was an internal rather than external fix, realized in two principal ways. In the first place, the city-states sought to widen the town-country relation, going to war in an effort to extend hinterlands and monopolize commercial opportunities. "Venice strove from the beginning of the 15th century to conquer territories on the mainland at the same time as Florence sought to subjugate Tuscany, extended as far as Leghorn, Pisa, the sea, and trying to include Siena" (Braudel, 1961, p. 276).³

A second strategy hinged on the transformation of the rural landscape, deepening the cities' hold on the countryside. Although "internal colonization" occurred throughout the 16th-century Mediterranean, according to Braudel (1972),

It was particularly marked in Italy. If Italy took no part in the great movement of colonization of distant territories the reason is perhaps partly to be sought in her preoccupation with reclaiming all available land within her own frontiers. (p. 66)

Italy had "its own Americas in the plains" (Braudel, 1972, p. 67).

These "internal Americas"⁴ were conquered by a variety of methods:

The cultivation of hillsides, the conquest of the mountain slopes, the reclamation of plains of every size [through water drainage], a fresh division of land between crops and pasture as agriculture continually displaced the grazing lands and herds they supported . . . This need brought about the destruction of trees and wild animals. (Braudel, 1972, p. 597)

But not only were the local flora and fauna destroyed. So too were humans. Land reclamation especially exacted a "high cost in human terms" (Braudel, 1972, pp. 82, 84).

The agro-ecological transformation of the countryside was intimately bound to class conflict and the circulation of capital in the Mediterranean world-economy. We have, in northern Italy's early modern cities, a classic instance of what Marx (1973) once called the "urbanization of the countryside" under capitalism. The great Italian cities were able to effect such widespread agrarian transformation at first because they had the capital to do so, accumulated through "an influx of big profits from trade, long-term and large-scale trade" (Braudel, 1972, p. 84). The "many improvement schemes" (p. 67) of the 15th and 16th centuries "demand[ed] ever more men and ever more money." Urban capital, which "found land by turns a profitable or safe investment," was happy to oblige (Braudel, 1972, p. 598; also Braudel, 1961, p. 269; 1993, p. 318). "A large-scale transfer of urban investment to the countryside was . . . taking place" (Braudel, 1972, p. 72). Land became increasingly attractive as northern Italy's manufacturing competitiveness declined relative to northwestern Europe, and Italian capital flowed either into financial ventures or "above all in[to] the countryside and [its] costly land improvement schemes" (Braudel, 1972, pp. 599, 69-70). Such improvement was also increasingly necessary as a rising urban population—not only in Italy but also in Castile and Provence—began to press against food supplies by the later 15th and 16th centuries (pp. 69-71).

Urban capital's "improvement" of the countryside was social and ecological in equal measure. As in 16th-century England, urban capital's agrarian transforma-

tions dispossessed—or heavily indebted—the peasantry and led to widespread banditry in Italy and elsewhere (Braudel, 1972, pp. 599, 80; for Spain, Braudel, 1973, p. 741). By the mid-16th century, “the palmy days of land capitalism” provoked “a social revolution in disguise.” In the Venetian *contado*, “social tensions between peasants and landlords first became apparent” by the 1550s, accompanying the surge of urban investment in the land that accompanied the recession in commerce (Braudel, 1972, p. 599), and Venice “may have lagged behind the rest of Italy” (p. 599). In Lombardy’s rice-growing areas, workers were “enslave[d] under terrible conditions” (p. 74). Peasants, who owned “less than 3 per cent of the land in the lower fertile region,” were not much better off. The peasant was “a kind of colonial slave”: “He had masters and what he produced went to them” (p. 75). Under these changing conditions, the “peasants were slaves to the crops as much as to the nobility” (Braudel, 1981, p. 124).

Invariably, urban capital’s growing domination of the agrarian landscape opened a widening gulf between rich and poor. Throughout the Mediterranean, large-scale estates, monoculture, and escalating social inequality went hand in hand (Braudel, 1972, pp. 74-77, 76n, 80-83, 155, 599):

One of the problems of the Mediterranean, and one of the causes of its traditionalism and rigidity, was that . . . newly-acquired land remained under the control of the wealth. A pick and axe might be enough in the North [of Europe], as it was later to be in America, to make the soil productive. In the Mediterranean rich and powerful landowners had an essential role to play, increasingly so as small-scale improvements were abandoned in favour of extensive, long-term [and large-scale] schemes. The goal could only be achieved by holding ranks under a discipline possible only through a rigid social order. (Braudel, 1972, p. 75)⁵

Far from denying middle-run social change in the everyday lives of the peasantry, Braudel (1972) suggests that urban capital’s invasion of the countryside might be conceptualized in terms of

successive alterations in the system of property owning and farming . . . [and] *successive* peasant orders . . . [Such a conception might take consideration of] the *extended impact* of the nearby towns that has continually upset the geographical and social order of the lowlands. (pp. 77-78; italics added)

And so Braudel, like Marx (as we shall see), relates the town-country antagonism to the socio-ecological antagonisms embedded in the rise of capitalism.

Venice and other urban economies responded to these contradictions by importing rivers of grain from as far away as Flanders, England, and the Baltic during the 16th century (Braudel, 1972, p. 599; 1981, p. 126; 1984a, p. 108). The internal colonization of the “‘first’ 16th century gave way sooner or later to” the external strategy of the “second” 16th century (Braudel, 1972, p. 606). For Venice, this meant securing through trade what it could not extract—owing in part to widespread social unrest emerging from agro-ecological change—from its own countryside. The grain trade, at least over the short run, allowed Venice’s ruling strata to shift the burden of agrarian crisis from their shoulders onto the backs of the urban poor, for whom grain shortfalls were nothing short of “catastrophic” (Braudel, 1972, p. 606).

Essentially, Venice pursued an external fix to the socio-ecological contradictions of extending and intensifying urban agro-hegemony over the surrounding

countryside. This was emblematic of a broader pattern. “The great cities of the 16th century with their agile and dangerous capitalism were in a position to control and exploit the whole world” (p. 342) through their penetration of the territorial states:

Venice cannot be explained simply by her *Terraferma* or her empire of shores and islands, although she exploited them with tenacity. She lived in fact off the great Turkish Empire, as the ivy draws its nourishment from the tree to which it clings. (p. 342)

While Venice relied partly on territorial expansion and partly on its relation to the Ottomans, Genoa pursued a much more “dangerous and agile” capitalist strategy. Largely abandoning territorial ambitions—its small contado was dominated by a powerful rural aristocracy that discouraged urban investment (Arrighi, 1994, p. 111)—Genoese capital “built up [an empire] in Spanish territory, at Seville, Lisbon, Medina del Campo, Valladolid, Antwerp, and America” (Braudel, 1972, p. 343). The Spanish Crown granted relative autonomy to this Genoese internal empire, with its “colonies of bankers [who] . . . were to affect so profoundly and penetratingly the financial and fiscal affairs of Spain on the eve of her American greatness” (p. 343). Under the “façade of subordination,” Genoese and other urban capitalists were “making their fortunes” (p. 344).

On a larger scale, the ascendant territorial states and their political centers forged geographically expansive town-country relations. Portugal, at one time a grain exporter, was by the later 15th century growing “increasingly uncertain of its daily bread” (Braudel, 1972, p. 586). Under pressure of an expanding world market, “Orchards, olives, and vines were taking up more and more room,” displacing cereal agriculture—evidence of a trend toward agricultural specialization, even monoculture, throughout the central and western Mediterranean by the 16th century (pp. 84, 155).

The need for grain, grain “imperialism,” drove the Portuguese to seize control of the markets of the wide Moroccan plains. . . . But the most satisfactory solution was to buy grain from outside, to *abandon what was basically an unprofitable domestic activity* [italics added]. (p. 586)

And so Lisbon’s hinterland expanded far beyond Portuguese territory to include parts of Andalusia, Castile, Sicily, Flanders, and even the distant Baltic (Braudel, 1972, pp. 196-197; also Braudel, 1984a, p. 140).

Portugal was not alone in globalizing its city-hinterland relations. Both territorializing Venice and expansionist Spain faced looming timber crises that threatened their naval power. By the 16th century there was “marked deforestation” in the western and central Mediterranean, especially in regions surrounding major shipbuilding centers such as (Spanish-controlled) Naples (Braudel, 1972, p. 142). Oak, the basic raw material for hull construction, was becoming rare. Venice’s problems were particularly severe. “Throughout the 16th century . . . deforestation advanced quickly” (p. 142). As with grain, toward the end of the 16th century both powers tried to extend their timber hinterlands through commerce. To build his “Invincible Armada,” Spain’s Philip II “tried to buy . . . trees” from as far away as Poland (p. 143).

The lines of causation could run equally well the other way, for cities and states not only reshaped hinterlands in accordance with changing demands in the world-economy, but the world-economy itself reshaped town-country relations at these

smaller scales. This is implicit in Braudel's contention that Portuguese agriculture by the 16th century had begun to shift toward higher profit lines in orchards and vines, abandoning cereal agriculture—an unprofitable domestic activity. So also with sheep farming in Castile, the rise of which was “impossible and unthinkable” (Braudel, 1972, p. 94) without a series of changes both within the Mediterranean (such as “the thriving textile industry of the Italian towns”) and outside it (p. 94). So too with the rise of Barcelona. “Outside forces were largely responsible for her original rise” (p. 147) as well as the “active coastal region” that sustained the great coastal city (p. 145).

This story of the evolving town-country relations at multiple geographical scales is at times related directly to environmental history. Braudel (1972) asks,

How many islands were invaded by foreign crops, whose justification lay solely in their position on Mediterranean or even world markets? Grown for export only, these crops regularly threatened the equilibrium of the island's economy. They were often responsible for the threat of famine. . . . We can see this in an exaggerated form, blindingly clearly in the islands of the “Mediterranean Atlantic”: Madeira, the Canaries, Sao Tome, which were all literally ravaged by the monoculture of cane sugar, as colonial northeast Brazil was to be later. Madeira, which was originally a timber island, rapidly lost the major part of its forest cover to the sugar mills and their need for fuel. This revolution was carried out entirely in the interests of a Europe which was clamouring for the precious sugar, and not in the interests of the islanders themselves. For the tragedy of sugarcane is that wherever it is grown it prevents the growing of other crops in rotation and restricts the space available for food crops. *The new arrival completely upset the old [ecological] balance* and was the more dangerous since it was protected by a powerful capitalism which in the 16th century was lodged in many quarters, in Italy, Lisbon, and Antwerp. And it was impossible to offer resistance. In general the island populations were unable to withstand the drain on their resources. In the Canaries, sugar was almost certainly as responsible as the brutalities of the first conquerors for the disappearance of the indigenous natives, the Guanches. And it was the sugar plantations which generalized the use of slave labour. . . . These are examples taken from the Atlantic. But there is no shortage of strictly Mediterranean examples. Take the wheat-growing invasion of Sicily; until 1590 and even after, Sicily was the Canada or Argentina of the western countries of the Mediterranean. Chios produced mastic . . . Cyprus, cotton, vines, and sugar; Crete and Corfu, wines; Djerba, olives. These single crop economies were the result of foreign intervention, artificial and often harmful to what is expressed by the German term *Volkswirtschaft*. (p. 155; also p. 142)

Here, the Braudel that treats nature “as a backdrop” (Beinart, 2000, p. 170) is nowhere to be found. Rather, in this passage, Braudel crystallizes four main aspects of his ecohistorical perspective found throughout the first volume of *The Mediterranean*. First, the Mediterranean Islands were subordinated to urban capitalism, representing a deepening and widening of the town-country dialectic. Second, for Braudel no less than Marx, the town-country relationship was profoundly antagonistic. It was bound up with class inequality and social unrest. Third, the domination of rural landscapes by urban capital occurred through the imposition of monocultures that disturbed previously existing equilibria of society and nature. This was an ecological moment of imperialism, to be sure. Fourth, capitalism's domination of the land and the disruption of ecological balance was accompanied by the domination and outright destruction of human beings through slavery and

outright extermination—thereby conceptualizing the expansion of capitalism as a process that flows through human bodies as well as global space.

For reasons that we will uncover momentarily, Braudel was not always able to identify or explain the capitalist specificity of these town-country relations. Nevertheless, he reveals a keen eye for what geographers would later call the “production of nature” (Smith, 1984). In Crete and Corfu, as in Cyprus, “we must imagine a countryside converted by man for the cultivation of the vine” (Braudel, 1972, p. 156; also p. 72 on Lombardy plain). These islands were “colonial economies” (p. 157). Without explicitly theorizing the question of geographical scale, then, Braudel nonetheless presents a perceptive account of local-global linkages, organized through the active transformation of nature in the interests of capital accumulation and urban aggrandizement. At all points, Braudel rejects any static conception of geography. Indeed, although perhaps hidden and not systematized, we find in *The Mediterranean* the kernel of the idea that urban capital’s domination of agrarian space generates socio-ecological contradictions that can be attenuated but not solved through geographical expansion. Urban and territorial economies alike sought to extend geographically—through trade and conquest—their respective town-country configurations to enlarge the arena for urban capital investment, to feed growing populations, and to gain the upper hand in military struggles.

AGRONOMIC DETERMINATIONS: WORLD-HISTORICAL IMPLICATIONS

Next, we might consider Braudel’s conception of agronomic “choice” (Braudel, 1977, p. 11). Braudel suggests that wheat, rice, and maize—the “plants of civilization” (p. 107)—exerted a strong influence over the fate of European, East Asian, and American civilizations:

Europe chose wheat, which devours the soil and forces it to rest regularly; this choice implied and permitted the raising of livestock. Now, who can imagine the history of Europe without oxen, horses, plows, and carts? As a result of this choice Europe has always combined agriculture and animal husbandry. It has always been carnivorous. Rice developed out of a form of gardening, an intensive cultivation in which man could allow no room for animals. This explains why meat constitute such a small part of the diet in rice-growing areas. Planting corn is surely the simplest and most convenient way to obtain one’s “daily bread.” It grows very rapidly and requires minimal care. The choice of corn as a crop left free time, making possible the forced peasant labor and the enormous monuments of the Amerindians. Society appropriated a labor force that worked the land only intermittently. (Braudel, 1977, pp. 11-12)

Although this notion of agronomic determination can easily slip into an environmental determinism of the sort espoused recently by Jared Diamond (1997), I think we can preserve a useful kernel. I am thinking especially of Braudel’s comparison of China and Europe in terms of agro-ecological biases toward geographical consolidation and expansion. China’s great advantage was the productivity of its wet-rice complex. Whereas a single hectare of wheat planted in 18th-century France yielded 1.5 million calories for human consumption, in East Asia the same hectare of rice yielded 7.35 million calories (Braudel, 1981, p. 151). Wet rice’s great disadvantage? Its voracious appetite for labor. Rice “holds the world record for the amount of manhandling it requires” (p. 145). Wheat demanded compara-

tively little labor. Alas, “wheat’s unpardonable fault was its low yield; it did not provide for its people adequately” (p. 120). It also tended to exhaust the soil. “Wherever it was cultivated, wheat was sown in a different field from one year to the next. . . . [It] cannot be cultivated on the same land for two years running without serious harmful effects. It has to be rotated” (Braudel, 1981, p. 114; also 1977, p. 11). But here, too, wheat’s disadvantages were turned to Europe’s favor. Wheat’s stimulus to livestock raising in turn provided Europe with animal power considerably greater than Africa’s and Eurasia’s other civilizations, not to mention the Americas’ (pp. 341-352)—a decisive advantage in (and even impetus to) Europe’s conquest of the latter.

One implication is that Europe’s wheat-livestock complex was relatively more biased toward territorial expansion than was China’s wet-rice system. Wheat’s soil-exhausting properties—especially its reliance on livestock to replenish fertility—tended to call forth new rural-urban configurations and encourage territorial expansion:

If . . . productivity was to be increased, then more fertilizer was needed, and this meant giving more land over to livestock . . . at the expense naturally of arable. . . . Triennial rotation, which rests the land for a year before sowing wheat on it, without allowing much to be grown on the fallow field, and which gives an absolute priority to cereal production, generally results in fairly low yields. Wheat fields are not admittedly, as rice-fields are, completely closed systems, sufficient to themselves: the necessary livestock could always be pastured in forests, newly cleared land, hayfields. . . . But these resources were not sufficient. (Braudel, 1981, p. 117)

Productivity could be increased only by converting arable to pasture to ensure adequate fertilization of the former. But if arable was converted to pasture, there was obviously less land upon which to grow wheat, which tended to “devour the soil” (Braudel, 1977, p. 11). A partial solution was found in convertible husbandry toward the end of the Middle Ages in northwestern Europe (Davis, 1973, pp. 112-113). For the most part, however, the rising grain surplus that fed the expanding early modern European world-economy was achieved through geographical restructuring and expansion. The

underpopulated and underdeveloped countries able to supply Europe with the grain it lacked were almost always on the margins to the north, or east . . . or even to the south . . . *The process was subject to frequent revision.* One granary closed and another opened. In the first part of the 17th century it was Sweden (Livonia, Estonia, Scania); from 1697 until 1760, England, under the impetus of export subsidies which encouraged enclosure; in the 18th century, the English colonies in America. (Braudel, 1981, p. 126; italics added)

A vicious circle? Yes, but one that appears to have worked to Europe’s advantage in the early modern era. In the absence of immediate and wide-ranging modern agrarian transformation, urban merchants and financiers relied on their superior command of mobile capital to ensnare and force successive regions, first within Europe and then abroad, into subordinate positions as grain exporters, thus increasing the grain surplus without significant increases in productivity. This reinforced high value-added agriculture in northwestern Europe, which supported large and profitable nonagricultural sectors through cheap grain. . . which remained

cheap so long as Europe's division of labor continued to expand geographically (see Brenner, 2001; Moore, 2003a).

The contrast with China is instructive. Wet rice, which did not face wheat's problems of soil exhaustion, seemed to favor territorial consolidation over expansion. Its agro-ecological challenges, however, were in certain respects "even more tyrannical and enslaving" (Braudel, 1981, p. 145). Wet rice receives its nutrients through water flows, depending on "hydraulic technology . . . to create and [then] suspend the movement of water" (p. 145). In contrast to western Europe's agricultural technology, this hydraulic system required control from above. Wet rice thus "implies a stable society, state authority and constant large-scale works" (p. 149).

To the extent that wet rice favored state authority, China's tendency toward rapid expansion would be constrained. Whereas settler expansion in medieval Europe entailed no necessary expansion of state power—indeed, often quite the opposite, as in the case of Poland—the situation in China was vastly different:

The increase in the number of rice-fields implied an increase in state control. It also implied the concentration of villages [thereby doubly favoring an increase in state power]. . . . The rice-fields therefore brought high populations and strict social disciplines to the regions where they prospered. (Braudel, 1981, p. 149)

Chinese expansion was limited by state power in ways that were relatively unimportant in the more anarchic West. For instance, in the south, the Empire's main zone of wet-rice cultivation, "the Chinese . . . did not try, and fail, to conquer the mountain regions: they never attempted it. . . . Rice-growing was not initially directed towards outlying areas and new land, but became established around the already existing towns" (Braudel, 1981, p. 155). Town-country relations in the East, then, tended to be oriented toward productive intensification rather than spatial expansion. This tendency was reinforced further by rice's ecology, which relative to Europe tended to favor a more sustainable metabolic relationship between town and country, where urban wastes were returned to the soil (pp. 155, 486).

Much of this comes perilously close to Wittfogel's (1957) "oriental despotism" thesis. What I would like to emphasize is not so much Braudel's particular interpretation of Chinese or European history but rather the fruitfulness of linking politics, economy, and agro-ecology in a long-run, historical-geographical perspective. It is widely accepted, for instance, that the ecology of sugarcane shaped the labor processes and class relations of the modern sugar plantation (Mintz, 1985; Moore, 2000b) and that wheat- and corn-raising biased certain regions toward slavery or free labor in the antebellum United States (Earle, 1987). I am suggesting that what holds true at the scale of the plantation and smaller agricultural regions has some purchase on "civilizational" questions as well. If Europe and not China conquered the world, is it not reasonable to say that this had something to do with longstanding agro-ecologies and agricultural practices?

"BIOLOGICAL REGIMES" AND WORLD-ECONOMIES

The biological regime is among Braudel's least known, and I think most important, ideas. Between 1400 and 1800, argues Braudel (1981), a biological *ancien regime* held sway, constituting "a set of restrictions, obstacles, structures, proportions, and numerical relationships" (p. 70). Its principal features included "a number of deaths roughly equivalent to births; very high infant mortality; famine; chronic under-nourishment; and formidable epidemics" (p. 91). Making its

appearance in the early pages of *The Structures of Everyday Life*—the first volume of his *Civilization and Capitalism* trilogy—the concept of the biological *ancien regime* is among the chief structures establishing “the limits of the possible” for the whole of early modern civilization. The biological *ancien regime*, Braudel argues, constitutes one of those “ceiling[s] which restricts all human life, containing it within a frontier of varying outline[,] . . . a border which in every age, even our own, separates the possible from the impossible” (p. 27). Although it is not always clear—especially to American social scientists, who tend to read the later volumes of Braudel’s trilogy at the expense of the first—Braudel’s underlying (if undeveloped) argument holds that the history of biological regimes shapes in decisive ways the possibilities for commodity production and capital accumulation. (Whether the late-18th century marks the watershed in Europe’s biological regime remains an open question. But without Braudel’s concept, the question is not even up for debate.)

The biological regime should not be mistaken as a synonym for population history. Braudel’s (1980) conception is much broader than a demographic regime; it encompasses class structure, the division of labor, and food history. “All demography, all history, *indeed all social life*, all economics, all anthropology (and I could go on) are biological, are biological *as well*” (p. 154; italics added). From this standpoint, Braudel weaves together a number of key threads to explain the resurgence of general famines in early modern Europe. Chief among these was class inequality. There was a “separate demography for the rich,” observes Braudel (1981, p. 90). Class divisions were overlaid and reinforced by a deepening antagonism of town and country. As we have seen, urban capital turned “back to the land” during the “economic recession” of the 16th and 17th centuries. Everywhere, “land improvements schemes” required “superhuman effort” and were realized typically “to the detriment of peasant life” (p. 124). As rising poverty and famine swept through the European countryside, “The peasants lived in a state of dependence on merchants, towns and nobles, and had scarcely any reserves of their own” (pp. 74-75). Peasants were reduced to “slaves” (pp. 124-125). “They had no solution in case of famine except to turn to the town where they crowded together, begging in the streets and often dying in public squares” (pp. 74-75). The “regular invasions” of the towns by “armies of the poor, sometimes from very far afield” gave rise to increasingly harsh urban policies, such as England’s Poor Laws (pp. 75-76).

Braudel’s (1961) perceptive accounting of the connections among early capitalism’s transformation of the countryside, famine, and a broader reshaping of the town-country division of labor is reinforced and extended in his discussion of the long 16th century’s “price revolution” and food history. Far from a strictly circulationist perspective, Braudel finds that the silver revolution “unquestionably entailed considerable breaks in the daily life as well as the basic structure of Europe’s economy” (p. 177). In Braudel and Spooner’s (1967) famous study of prices in the early modern world-economy, the authors implicitly link Europe’s biological regime to the *conjoncture* of the Price Revolution:

It would in fact take many pages to write a history of meat and animal products throughout a Europe which although remaining immensely diversified and was gradually being forced to follow a common form of development. This would mean investigating a history of food which up to now has been composed largely of picturesque details never seriously classified, measured or compared. The history of food has hardly begun to rise above the level of anecdotes. What did meals consist of, what was their calorie content, and what was their market cost? Few of

these questions have been considered. . . . The history of prices could doubtless do no more than throw side-lights on this “realist” history of food, still in its beginnings. But it raises the problems well enough, or rather is the essential point of reference. *The other aspects—sociological or biological—must always be seen in reference to it.* The price of food-stuffs and the range of possible choices are the daily problem *par excellence* that has always beset humanity. (pp. 415-416; italics added)

Here, Braudel and Spooner (1967) seem to be arguing, the consumption and production of food constitutes a crucial moment of an expanding market-commodity system. “The history of prices” becomes inextricably bound with the “daily problem[s]” of the vast majority, who are increasingly caught up in a “common form of development.” Not strictly economic, the tasks of obtaining and supplying daily bread are in equal parts sociological and biological. Their effects rippled throughout the world-economy.

Among other things, the chronic undernourishment characteristic of the biological ancien regime was overdetermined by the price revolution. Within Europe between the 14th and 16th centuries, peasant and worker diets “experienced a favourable period,” but after 1550 deteriorated sharply. This was an “extraordinary step backwards” (Braudel, 1981, pp. 193-196). But it was precisely this backward diet that favored European development:

From 1400 to 1750 Europe was a great consumer of bread and more than half vegetarian. . . . Only this “backward” diet allowed Europe to carry the burden of a continually increasing population. . . . What people are generally less well aware of is that this situation sketched in 1750—large rations of bread and a little meat— . . . was itself the result of a deterioration and does not apply when we go back in time to the Middle Ages. (Braudel & Spooner, 1967, pp. 413-414)

Significantly, Braudel and Spooner (1967) relate this dietary shift to the restructuring of Europe’s division of labor and the changing daily lives of the direct producers. In the 16th century, rising grain prices (relative to meat) entailed a transformation of

stock-rearing in the great open spaces . . . into one in which arable farming invaded more and more pasture land, in its “obsessive” preoccupation to be able to feed a population which was increasing annually. In the west, regions where stock-raising brought a balance and pleasure to a farmer’s hard life became fewer and fewer. (pp. 414-415)

Regional specialization exerted a negative impact on the soil no less than everyday life. In eastern Europe, the price revolution led to “violent monetary devaluations and inflation accompanied by large-scale exports of grain” (Braudel & Spooner, 1967, p. 377) and of course the second serfdom’s sharp escalation of surplus extraction (Braudel, 1982). The combination of serfdom and cereal monoculture produced widespread soil exhaustion and “decreasing marginal yields” in the 17th century (Braudel, 1961, p. 259; 1981, pp. 122, 124).

Far from static, the division of labor could also move in the opposite direction. Toward the end of the biological ancien regime, for instance, rising meat prices in 18th-century France led to the widespread conversion of arable to pasture. The (predictable) result was “unemployment, and the reduction to beggary and vaga-

bondage of a considerable mass of the small peasantry” (Braudel, 1981, p. 196). Once again society and ecology appear dialectically bound.

As in *The Mediterranean*, structure and *conjoncture* again enter into dialectical tension. Braudel’s conception of the biological regime as a *longue duree* structure is deployed to clarify rather than to obscure conjunctural shifts; it underscores rather than obviates the need for attention to everyday life. The early modern biological regime was not static but under strain and stress throughout. “For in the *longue duree*, nothing stands still” (1993, p. 147; also 1980, pp. 25-54). Three vectors of strain and stress deserve special attention: (a) transformations of diets in favor of European (capitalist?) development (Braudel & Spooner, 1967, pp. 413-414); (b) transformations of the emergent world-scale division of labor, as pasture was converted to arable, leading to the decline of stock raising within the European core and its rise as a form of monoculture in parts of the eastern European and American peripheries (p. 414); and (c) the broad transformation of Europe into a unified world-economy (pp. 376, 415; also Braudel, 1961, p. 285). These insights provide fertile ground on which to develop a more rigorous and historicized conception of capitalism’s relation to the environment.

WORLD-ECOLOGIES, WORLD-ECONOMIES, AND HISTORICAL CAPITALISM

Braudel’s historical and conceptual contributions to world environmental history remain obscure. There are several reasons for this. In the first place, Braudel’s most important interlocutors in the English-speaking world have been sociologists, a discipline wedded to a “socio-cultural determinism” (Dunlap & Martin, 1983, p. 204) that ignores or marginalizes “the ecosystem dependence of human societies” (Dunlap & Catton, 1994, p. 6; also Foster, 1999). Second, Braudel’s conception of capitalism as, on the one hand, distinct from production and regularized market exchange and, on the other, material life, tends to dematerialize capital accumulation. Consequently, Braudel’s narrative strategy, above all in the *Civilization and Capitalism* trilogy, rendered him vulnerable to a range of one-sided and dematerialized appropriations, of which Arrighi’s (1994) nature-blind *The Long Twentieth Century* is only the most brilliant. Finally, the field of world environmental history has only just begun to emerge, and it has done so primarily among historians, for whom theoretical exploration is a manifestly secondary concern (Moore, 2003b).⁶

Ultimately, the factors behind Braudel’s reception and appropriation in world-historical studies are less important than the ways in which his corpus might be put to work. I suggest that we extend Braudel’s ecohistorical perspective in two steps. First, I consider briefly how Immanuel Wallerstein incorporated Braudel’s materialism into a Marxist perspective on world capitalist development in ways that deepened our understanding of capitalism as an ecohistorical system—as world-ecology as well as world-economy. Second, I show how this original synthesis of Marxist economic history and *Braudelien* environmental history might be enriched through a reexamination of Marx’s analysis of capitalism’s socio-ecological contradictions.

Within the world-historical perspective, the consensus holds that Wallerstein’s appropriation of Braudel abstracted environmental questions in favor of social history (Chew, 1997, 2001; Friedmann, 2000). The consensus, however, is profoundly flawed. Wallerstein’s (1974) analysis of the crisis of feudalism and the rise

of capitalism pivots on socio-ecological factors, including soil exhaustion, monoculture, epidemiological factors, stock raising and soil erosion, agronomic choice and the trajectories of Chinese and European civilizations, climate change, deforestation and timber scarcity, and dietary regimes (see Moore, 2003b).

Wallerstein develops two ecological ideas implicit in Braudel's work.⁷ First, he contends that agro-ecological transformations were crucial moments in early capitalism's geographical expansion. As we have seen, Braudel (1981) stresses the "frequent [geographical] revision" of Europe's granaries (p. 126). He identifies a similar pattern at play in the simultaneous relocation and global extension of medieval Europe's mining centers. The smelters' gigantic fuel consumption led to deforestation and rising fuel prices, coupled with rising labor costs and labor unrest. These problems led "the European economy as a whole" to "delegate the trouble of handling the mining and metallurgical industries to dependent regions on her periphery" (Braudel, 1982, p. 325). Stock raising also was relocated in the direction of the eastern European and the American peripheries (Braudel & Spooner, 1967, p. 414); so too was the fur trade, characterized by "gigantic slaughter":

In 1786, English and American vessels appeared in the North Pacific. Kamchatka was quickly cleared of its beautiful animals as a result of this hunting. *The trappers had to look farther afield* [italics added], as far as the American coast, even as far as San Francisco. (Braudel, 1981, p. 69)

For Wallerstein, of course, the rise of capitalism is unthinkable without geographical expansion. The capitalist world-economy did not expand from Europe to the Americas so much as it owed its very existence to the conquest and productive incorporation of the latter (Quijano & Wallerstein, 1992). The emergent system's ecological contradictions appeared in their starkest form on the frontier. Nowhere was this more evident than on the sugar frontier: "The [largely sugar] monocultures imposed on the Mediterranean and Atlantic islands ravaged them, pedologically and in terms of human population. Their soils were despoiled, their populations died out" (Wallerstein, 1974, p. 89). With sugar, we have a "very lucrative and demanding product, pushing out wheat but then exhausting the soil, so that it required ever new lands (not to speak of the manpower exhausted by its cultivators)" (Wallerstein, 1974, p. 44; also Wallerstein, 1980, pp. 162, 162n). As with Braudel (and Marx too, as we shall see), the degradation of the soil and the degradation of the laborer are historically linked.

Wallerstein's second major elaboration of Braudel's ecologically minded materialism is an explicit rendering of the dialectical connection between world-economy and world-ecology. The crisis of feudalism can be explained as a "socio-physical conjuncture" (Wallerstein, 1974, p. 35). The rise of capitalism was predicated on an epochal reorganization of "world ecology." Here, then, is the embryo of an ecological theory of imperialism, whereby "world ecology was altered and in a way which, because of the social organization of the emergent European world-economy, would primarily benefit Europe" (Wallerstein, 1974, p. 44). (And the European core above all!)⁸

What I think merits amplification is the linkage of world-ecology with the rise of capitalism. Are we not here dealing with the production of nature in a thoroughly world-historical sense? (And by the same measure, a thoroughly materialist-constructionist sense too?) The agro-ecological transformations of the long 16th century signaled not only the rise of a capitalist world-economy but equally the emergence of a capitalist *world-ecology*. What I am suggesting is not the interac-

tion of a world-economy in one box and a world-ecology in the other but rather a conception of capitalism in which economy and ecology are increasingly unthinkable without each other.

The distinctiveness of capitalism as world-ecology, then, is not found simply in its large-scale transformations of nature. Rather, its distinctiveness might be best located in the ways that it progressively deepens the world-historical character of microlevel socio-ecologies in the interests of the ceaseless accumulation of capital, which generates geometrically rising pressures for ceaseless global expansion. So what may seem at first glance a trivial terminological maneuver is intended to illuminate a substantive *problematique*. With the rise of capitalism, local societies were not integrated only into a world capitalist system; more to the point, varied and heretofore largely isolated local and regional socio-ecological relations were incorporated into—and at the same moment became constituting agents of—a capitalist world-ecology. Local socio-ecologies were at once transformed by human labor power (itself a force of nature) and brought into sustained dialogue with each other. The historical-geographical specificity of this dialogue and this transformation, as we shall see, was decisively shaped by capitalism's peculiar crystallization of wealth—especially the centrality of monetary accumulation—and its related town-country antagonism. These specificities would undermine the socio-ecological conditions of accumulation, necessitating recurrent waves of geographical expansion. Hence, the hyphen becomes appropriate: We are talking not necessarily about the ecology of the world (although this is in fact the case today) but rather a world-ecology.

If this is the case, then the ecology-society dualism becomes historically as well as theoretically untenable. From the standpoint of the rise of capitalism, world-economy and world-ecology represent distinct angles of vision onto a singular world-historical process. Seeing these two moments as a “separation in unity” (as Marx would say) allows us to build on Braudel's vague yet suggestive notion of the economy-ecology dialectic. Through the concept of capitalist world-ecology, we can begin to better comprehend the specific form of the modern world's antagonism between capitalism's drive to accumulate endlessly and the demands of ecological sustainability.

Wallerstein is clearly aware of this antagonism but seems unwilling to theorize its underlying basis, which in my view pivots on capitalism's production of value as abstract social labor. Perhaps stemming from his preference for thinking capitalism in conceptual-historical terms rather than any pure model of the capital system, Wallerstein has eschewed anything approaching formal theorization. I think Wallerstein is, on balance, correct in his assessment that efforts at the formal theorization of capitalism are premature—this is why he consistently argues against the formulation world-systems “theory” (Wallerstein, 2002). But in this instance, the assessment may be unduly limiting. In *Capital*, Marx (1977) usefully illuminates capitalism's value form as the foundation of the system's social antagonisms. But he does more than just this. Marx also points to the metabolism of capitalism's value production, the antagonisms of which play out at the point of production and within broader layers of the social division of labor simultaneously (Marx, 1977, pp. 283, 636-638; also Burkett, 1999). Without a conception of how capitalism distills wealth into a historically specific social form (value), I think we are left with market-centered explanations of ecological crises in the modern world. This is the circulationist danger in the Braudel-Wallerstein approach, one that has been expressed in scores of otherwise very critical environmental histories (e.g.,

Cronon, 1991; Merchant, 1989). The point is that markets and production under capitalism assume historically specific forms that create serious contradictions between ecological sustainability and economic development. Neither markets nor particular forms of production (such as industrialization) are in themselves to blame. So although Wallerstein's skeletal yet suggestive conception of capitalism points toward the general problem of modernity's nature-society antagonisms, the outlines of this view might be most effectively fleshed out through a reexamination of Marx's ecological thinking.

MATERIALISMS, PASSIVE AND ACTIVE: MARX'S ECOLOGICAL CRITIQUE OF CAPITALISM

Wallerstein's great innovation was to deploy Braudel's insights to revitalize the materialism fully present in classical Marxism, but which had atrophied with the rise of Western Marxism, still hegemonic in the 1960s (Foster, 2000). At this point, Wallerstein has taken Braudel about as far as he can go. At a certain point compatible, the antagonism of Braudel's and Marx's materialism deepens as we search for ways to conceptualize the historical specificity of the capitalist world-ecology.⁹

Braudel's Materialism and the Problem of Capitalism's Ecohistorical Specificity

For all its ecohistorical insight, in the end, Braudel's conception of capitalism betrays a passive rather than active materialism. Braudel's emphasis on human agency in the making of the Mediterranean world-economy did not translate into an ecological (ecologized?) theory of social change. (This, I think, is the kernel of truth in the view that Braudel illuminated the role of environment rather than environmental history.) For Braudel, capitalism pivots on the self-expansion of capital rather than any transformation of productive relations as such. Capitalism, in this rendering, encompasses the most profitable activities in a given world-economy. In the early modern era, this meant long-distance trade and finance, although it included some industrial activities such as mining.¹⁰ In this scheme of things, the distinctiveness of capital is found in "its unlimited flexibility" to shift from low- to high-profit activities (Braudel, 1982, p. 433; also 1984a). Capitalism is therefore not just analytically distinct, but in many ways empirically discrete, from the low-profit, regularized market exchanges of the market economy, not to mention the quotidian processes of birth and death, eating and growing, and trucking and shipping that are the meat and potatoes of everyday life.

Abstracting production and reproduction (material life), Braudel's theory of capitalism tends to dematerialize capital accumulation. But it does so in confusing and contradictory fashion. Nowhere is this more evident than in his conception of capital. Braudel (1977) emphasizes that "*Capital* is a tangible reality, a congeries of easily identifiable financial resources, constantly at work" (p. 47). The sound materialist observation that capital is a tangible reality is complicated by its characterization as a resource. In Braudel's hands, capital becomes a thing, a resource, detached from the social relations of production; it is fetishized—transformed into an entity "constantly at work." Thus does Braudel's materialism assume an increasingly passive character. At this point, Braudel's materialism begins to collapse under the weight of its mounting contradictions. Divorcing capitalism from the transformation of production (and reproduction) relations tends toward a dematerialized theory of capital accumulation on which human and extrahuman

nature have little purchase. Nature, in other words, is rendered exogenous; its transformation may or may not enable or constrain future accumulation.

These contradictions undermine efforts to explain the rise of capitalism as a distinct ecohistorical system and fetter the elaboration of an activist-materialist theory of capitalist development. In this respect, Braudel's influence (although not only Braudel's influence) has permeated recent world-historical studies: Rising commercialization and market exchange enables the accumulation of monetary wealth and commodity production to be transmuted into capital accumulation; its geographical enclaves are celebrated as interstitial spaces of incipient or immature capitalism waiting for the necessary world-historical conditions to flourish. The rise of capitalism, in other words, is explained in terms of the rise of capitalism (Abu-Lughod, 1989; Arrighi, 1994, 1998; Braudel, 1984a, pp. 57, 108-109; Chase-Dunn & Hall, 1997; Mielants, 2000). For environmental historians, the blurring of capitalism's historical distinctiveness feeds the conviction that ecological differences between modern and premodern world-systems are one of degree rather than of kind (e.g., Broich, 2001; Chew, 2001; Hughes, 2001).

Whether the transition to capitalism affected a revolutionary and epochal break in nature-society relations is an empirical question that cannot be solved by theoretical fiat (see Moore, 2002, 2003a, 2003b). Either there was or there was not a major change in the scale, scope, and speed of ecological transformation in the long 16th century. But once we begin to conceptualize capitalism and capital accumulation narrowly, in terms of commercialization and resources, our ability to discern epochal shifts in world-economies and world-ecologies is dramatically compromised.

***Marx's Historical-Geographical Materialism:
Nature, Labor, and the Theory of Metabolic Rift***

If Braudel's materialist conception of capitalism, along with recent efforts to extend and develop that conception (e.g., Arrighi, 1994), tends towards an ecohistorical cul-de-sac, Marx and Engels's historical-geographical materialism offers a way out.¹¹ Three aspects of their ecological materialism deserve special attention: (a) the coevolutionary theory of history, constituted by a materialist and relational conception of human and natural history; (b) the ecological significance of the labor theory of value; and (c) the importance of the theory of metabolism and the metabolic rift. Together, these form the basis for an active materialism and theorization of historical capitalism's ecological-crisis tendencies.

Darwin's groundbreaking work, Marx wrote to Engels in 1860, "contains the basis in natural history for our view" (Marx & Engels, 1936, p. 126).¹² Although critical of Darwin's (1859/1964) sometimes narrow and Malthusian view of the "struggle for existence" (Engels, 1939, pp. 75-85), Marx and Engels shared with him a view of history characterized by struggle, adaptation, transformation, and above all, the dialectical interplay of organism and environment. Their great innovation was to adapt and build upon Darwin's conception of natural history, in which organism and environment alike are transformed, each determined by and determining the other. From this standpoint, human evolution encompasses social as well as natural history. "Just as animal organs represented the instruments by which animals had adapted to their local environments," humans developed tools that expressed their active relationship with nature. Labor defines "the distinctive ecological niche occupied by humanity" (Foster, 2000, p. 201; see also Engels, 1972). It "allows us to recognize that human beings transform their environment

not entirely in accordance with their choosing, but based on conditions provided by natural history," including those natural-historical conditions produced by previously existing societies (Foster, 2000, p. 205). Nature shapes and is actively shaped by society.

This coevolutionary perspective establishes the basis for Marx and Engels's ecological critique of capitalism. At its core, this critique rests on the labor theory of value and the relational character of capital. In contrast to the Braudelian view of capital qua resource, Marx (1967) views capital as "a definite social production relation, belonging to a definite historical formation of society, which is *manifested* in a thing, and lends this thing a specific social character" (1967, vol. 3, p. 814; italics added). Under capitalism, the definite social production relationship of bourgeois and proletarian assumes the form of abstract social labor—the substance of value. Represented by money, value becomes the metric and the relation for the accumulation of capital, which seeks to remake the world in its image.

Value, Marx argues, is specific to capitalism. Contrary to Marx's ecological critics (e.g., Bunker, 1985), capitalism's historically specific value form is something quite different from what is "valuable." Marx (1971) does not deny that external nature does work useful to humans, only that (from the perspective of capital) its productions do not directly enter into capitalism's particular crystallization of wealth, wherein all sources of wealth must be dissolved into the monetary form (pp. 488-889, 268-269). Far from an endorsement of capital's value form, Marx's conception is a radical critique. Indeed, by extinguishing "the natural and social characteristics" of human and extrahuman nature (Marx, 1959, p. 77), the accumulation of value stands in stark contradiction to the sustainability of "the original sources of all wealth—the soil and the worker" (Marx, 1977, p. 638). What is so striking about Marx's now famous critique of capital's tendencies to degrade land and labor is the refusal to separate the two. Capital does not exploit land and labor so much as it exploits the land through labor. It could hardly be otherwise, given the nature of capital as value in motion, the very lifeblood of which is labor abstracted from its socio-ecological specificities.

Marx's value analysis is so ecologically compelling because it illuminates the contradiction between the accumulation of value as abstract social labor (its social form) and the accumulation of value as material process (its spatial form). Money emerges as the general equivalent of value, mediating the contradiction between value's "social generality" and its "material particularity"—between the abstraction of social labor and the specificities of the external environment and the concrete labors that work it up. Money "solves" (however temporarily) this contradiction by "abstracting from the qualitative differentiation of useful labor as conditioned by the material diversity of human and extra-human nature—the true sources of wealth" (Burkett, 1999, p. 84).

Abstracting from socio-ecological particularities, monetary capital accumulation therefore permits, indeed compels, a radical simplification of internal and external nature. Where environmental historians, such as Worster (1990) and Cronon (1991), account for such simplification in terms of the circulation of commodities and monetary capital divorced from the production of value—essentially a Braudelian perspective—Marx's approach orients us toward the relationship between place-specific commodity production and capital accumulation within much broader arenas. On the one hand, the endless accumulation of capital hinges on rising productivity. This entails increased control in various forms, which tends generally toward the reduction of concrete labors and all manner of ecological

specificities (of which labor is but one) to an “interchangeable part” (see Braverman, 1974, pp. 181-182).¹³ On the other hand, money itself acts to dissolve ecological specificities by reinforcing tendencies embedded in the production process. “Prices attach to particular things and presuppose exchangeable entities with respect to which private property rights can be established or inferred,” argues David Harvey (1993, p. 6). “This means that we conceive of entities as if they can be taken out of any ecosystem of which they are a part. We presume to value the fish, for example, independently of the water in which they swim” (Harvey, 1993, p. 6).¹⁴ Taking together these two moments, we can see that landscapes and nonhuman organisms are not alone in suffering the ecological contradictions of value accumulation. Capitalist production reduces the worker to “a mere fragment of his own body[,] . . . crippling . . . the [laborer’s] body and mind” (Marx, 1977, pp. 482, 484; also 1959, pp. 19-20, 75-76). Capitalism, Marx observes, “is the first system to provide the materials and the impetus for *industrial pathology* [italics added]” (1977, p. 484).

Capital is self-expanding value. It is value in motion and, as such, knows no bounds. But use value does (Marx, 1973, p. 87). Because all value is embedded in particular use values and because the law of value compels rising productivity, the development of capitalism “means that each hour of abstract labor is now borne in a larger and larger quantity of use values and their material prerequisites. . . . Capital accumulation involves a growing quantitative imbalance between value accumulation and accumulation as material process” (Burkett, 1999, p. 110).

Geographical questions, above all concerning the town-country division of labor on a world scale, now begin to move toward center stage. Because value accumulation is at once social relation and material process it must perpetually seek social and material fixes to the contradiction between the two. If money is the social fix to the value-nature contradiction, inner expansion (intensification, fragmentation) and outer expansion (geographical expansion) constitute spatial fixes to this contradiction.

What I wish to suggest is that because value presupposes the separation of the direct producers from the land and the progressive subordination of agriculture to the law of value, the original accumulation of capital hinged on the original production of a new town-country antagonism, beginning in the long 16th century (Moore, 2003a). Furthermore, because the production of value presupposes limitless expansion—that is, it presupposes the “limitless drive to go beyond its limiting barrier” (Marx, 1973, p. 334)—it continually finds itself in contradiction with the ecological bases of value accumulation, especially, but not only, the socio-ecology of human labor power, which in turn demands the limitless expansion of the rural-urban dialectic.

At this point Marx’s theory of metabolism assumes decisive importance. The ecological contradictions of capitalism’s value form give rise to new and ever-extended configurations of town and country to sustain capital accumulation. The expanded reproduction of the town-country division, in turn, extends and intensifies the profound rupture in the nutrient cycling between the country and the city—that is, it disrupts the most basic metabolic processes necessary for ecological sustainability, as nutrients flow out of the countryside and into the cities, which are under no compulsion to return these nutrients. This is the “metabolic rift” (Foster, 1999, 2000), or what Marx (1981) calls the “irreparable rift in the interdependent process of social metabolism, a metabolism prescribed by the natural laws of life itself” (p. 949). This rupture in the metabolism of nature and society is fundamental

to capitalist development, variously liberating and limiting. Far from a mere output of the system, as Braudel's circulationist approach would have it, the metabolic rift is the ecological expression of the law of value. This compels not only the endless extension of the capital-labor relation but also, as its precondition, the endless extension of the town-country relation through the progressive domination of the earth. If the rural-urban dialectic expresses the geographical moment of the law of value, the metabolic rift is its ecological expression.

Marx's conception of metabolism is particularly useful in illuminating the interplay between global and local history, implicit and yet poorly understood in most environmental history. As I have argued, with the rise of capitalism the labor process, and through it the physical organization of the land, becomes radically (and progressively) simplified. (This is of course a long-run and uneven process.) Plantation monocultures and row planting by specialized labor gangs as far back as the 15th century are a prime example (Moore, 2000b, 2003a, 2003b). In this way, capitalist agriculture undermines the biodiversity essential to sustainability—this is so because plantation agriculture, even when organized by large landed property rather than directly by the bourgeoisie, was disciplined by a world market that demanded (on pain of extinction) relentless efforts to cut costs and maximize surplus production. This was the law of value in formation, demanding that enterprises abstract from biodiversity and all other ecological demands to the greatest possible extent.

By compelling rising productivity—which sets in motion all manner of transformations in the technical and social divisions of labor—capital's domination of the earth created the conditions for a new town-country dialectic significantly different from that of feudal Europe. Regional city-hinterland relations were complemented, and at times displaced, by more geographically expansive town-country relations. One might consider, for example, the new relationship that took shape between Dutch cities and the Baltic in the early modern era—a relationship that Wallerstein (1974) characterizes as a system of "international debt peonage" (pp. 121-122). Sixteenth-century Amsterdam depended on Baltic grain for a quarter of its needs—one result being widespread soil exhaustion in eastern Europe's grain exporting regions in the next century (Wallerstein, 1980).

In sum, the new configuration of town and country that took shape out of primitive accumulation at multiple geographical scales at once radically extended and accelerated extant and typically localized ecological problems. The metabolic rift was globalized with the rise of the capitalist world-ecology, and here we find a significant implication of the theory of metabolic rift. Because capitalism's relation to the soil is unsustainable, it is fated to the relentless quest for new frontiers. Its first and best option has always been geographical expansion. These waves of expansion have been part and parcel of new town-country relations and new means of exploiting land and labor in successive long centuries of capitalist development. Secondarily, internal colonization and the increasingly thorough commodification of life and labor has offered relief over the very short-run. But over the *longue duree*, it is geographical expansion that really matters (Moore, 2000a). Thus does Marx's theory of metabolic rift, rooted in his conception of value, provide a powerful angle of vision from which to understand capitalism's unsustainability at the very largest and very smallest geographical scales—that is, how the world-economy, the world-ecology, and the laboring body are mutually constitutive of and relational to each other over long historical time.

CONCLUSION

Marx and Engels's historical-geographical materialism points to a theory of capitalism that sees ecological contradictions as central to accumulation, crisis, and world development. Ecological crisis and ecological change are implicated in the historical genesis and expanded reproduction of capital at multiple geographical scales. Above all, with the rise of capitalism, the concrete and place-specific labors of commodity production became articulated with an increasingly globalized regime of monetary accumulation, together constituting what Marx calls an "organic whole" (1973, p. 100; see also Marx & Engels, 1970).

The root of the problem is not commodity production as such but rather the emergence of a social system predicated on its generalization. Capitalism, by its nature, tends toward, even if it can never accomplish, the commodification of everything. This it seeks to accomplish through monetary capital accumulation. Enabled by recurrent waves of primitive accumulation, monetary capital tends to dissolve the original sources of wealth, land, and labor into a common metric that disregards the diversity of life. At every step, the contradiction between capital and nature reveals the historical specificity of humanity's active relation to nature, which is to say the relation of "nature . . . linked to itself, for man is part of nature" (Marx, 1959, p. 67).

This, it seems to me, represents a most useful means of approaching the history of capitalism in a way that sees ecological transformation as part and parcel of the system's successive waves of restructuring over the past 5 centuries (Moore, 2000a). Nature, understood in terms of bodies and landscapes, becomes at once ecologically determined and socially constituted. That is to say, nature and society coevolve. To paraphrase Marx, classes make history, but not in ecogeographical situations of their choosing. Socio-ecological conditions at any given moment represent the historical-geographical residue of previous eras, which, no less than social or political history narrowly conceived, can weigh "like a nightmare on the brain of the living" (Marx, 1972, p. 437).

In contrast, Braudel's materialism de-links the production of capital from the production of nature. It gives rise to a theory of capital (and capitalism) that renders the environment exogenous. But if this were the end of the story, there would be little point in considering Braudel's contribution to environmental history. Fortunately, the story does not end here. Nature comes in through the back door of Braudel's materialism. In *The Mediterranean* especially, Braudel recognizes that world-economies are ecological; the former do not simply interact with local ecologies. World-economies and world-ecologies are unthinkable without each other. What Braudel sometimes lacks is a recognition of the tension between the two—but only sometimes. He recognizes that merchant capital's imposition of monocultures on island political ecologies induced radical transformations of land, labor, and society. Ecology was implicated in imperialist expansion and social inequality. Socio-ecological contradictions in fur trade, in mining, and even in grain cultivation induced successive waves of restructuring and geographical expansion. A new biological regime favorable to capitalist development, knitting together diet and accumulation on a world scale, took shape in the aftermath of the Black Death. If Braudel seldom explains these antagonisms and transformations, he identifies these moments of large-scale socioecological change in a way that offers new vistas from which to view the environmental history of the modern world.

NOTES

1. Here Braudel overstates his case. *The Mediterranean* is replete with discussions of the grain trade's significance (e.g., 1972, pp. 584-586, 596-99).

2. I have occasionally drawn from Braudel's important 1961 essay on European expansion to supplement the discussion of *The Mediterranean* as well as *Civilization and Capitalism*. Braudel's essay has the great virtue of making "explicit the connection between the book on the Mediterranean and the later one on capitalism, and sketches clearly the centrality of the European expansion process during the 'long sixteenth century' so decisive for the history of humanity" (Aguirre Rojas, 2001, p. 33).

3. Here I have opted for Wallerstein's translation: Braudel (1966, p. 62) as quoted in Wallerstein (1974, p. 42).

4. In this passage, we see traces of the influence of Wittfogel's (1957) hydraulic despotism thesis, which emphasized the relationship among agro-ecological productivity, infrastructural improvement, and authoritarianism.

5. For instance, Donald Worster's (1990) innovative and widely read theorization of modes of production in world-environmental history has had no significant impact on research in the field.

6. Wallerstein's crucial methodological decision, constituting a major break with Braudel, was the prioritization of agrarian capitalism in the long 16th century. If Braudel (1981) regarded "capitalism and towns" as "basically the same thing in the West" (p. 514), Wallerstein's point of departure was "capitalist agriculture." Perhaps unintentionally, in this way Wallerstein effectively recast the "agrarian question" that had so preoccupied pre-World War I Marxists—a decision that led him to the very agro-ecological issues that concerned this earlier generation (e.g., Bebel, 1988, pp. 204, 207-208; Bukharin, 1925; Kautsky, 1988, pp. 214-215, 220, 245-249, 254; Lenin, 1961, pp. 155-156; see also Foster, 2000, pp. 226-256).

7. For groundbreaking works that extend a classical Marxist conception of imperialism into the ecological realm, see Davis (2001) and Foster and Clark (in press).

8. It is perhaps for this reason that Wallerstein's ecohistorical emphasis in the first volume of *The Modern World-System* began to fade in subsequent editions in 1980 and 1989.

9. "Capitalism," Braudel (1982) argues, "did not emerge in its full maturity and with explosive force until very later—the very beginning of the twentieth century" (p. 22); "between the fifteenth and eighteenth century, these constraints [the patterns of everyday life] hardly changed at all" (1981, p. 27).

10. Perhaps uncharitably, I will use "Marx" as a shorthand for Marx and Engels's collective project.

11. Marx and Engels, argues Foster (2000), "applied the notion of 'natural history' in a Baconian fashion, which focused on the 'natural history' of human beings in relation to production" (p. 196).

12. My approach here follows the spirit of Braverman's (1974) interpretation of the labor process, which necessarily (although Braverman did not see this) entails a radical simplification not just of concrete labors but of the ecological wealth that the former reshapes:

We see that this abstraction from the concrete forms of labor . . . which Marx employed as means of clarifying the value of commodities (according to the share of such general human labor they embodies), is not something that exists only in the pages of the first chapter of *Capital*, but exists as well in the mind of the capitalist, the manager, the industrial engineer. It is precisely their effort and métier to visualize labor not as a total human endeavor, *but to abstract from all its concrete qualities in order to comprehend it as universal and endlessly repeated motions* [italics added]. . . . In this form [labor] comes ever closer to corresponding, in life, to the abstraction employed by Marx in analysis of the capitalist mode of production. (pp. 181-182)

13. This exchangeability, as Harvey's reference to property rights suggests, hinges on recurrent waves of primitive accumulation. What in "primitive accumulation appears as a distinct historical process[,] . . . accumulation merely presents as a *continuous process*" (Marx, 1971, p. 272). According to E. P. Thompson (1991), a "global ecological history might be written" of this continuous process—namely, the use of state power (law above all) to "reorganis[e] alien agrarian modes of production" (p. 164). From this standpoint, the state plays a crucial role in enabling the radical simplification of nature and is sometimes a direct agent (see Scott, 1998, pp. 11-52).

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