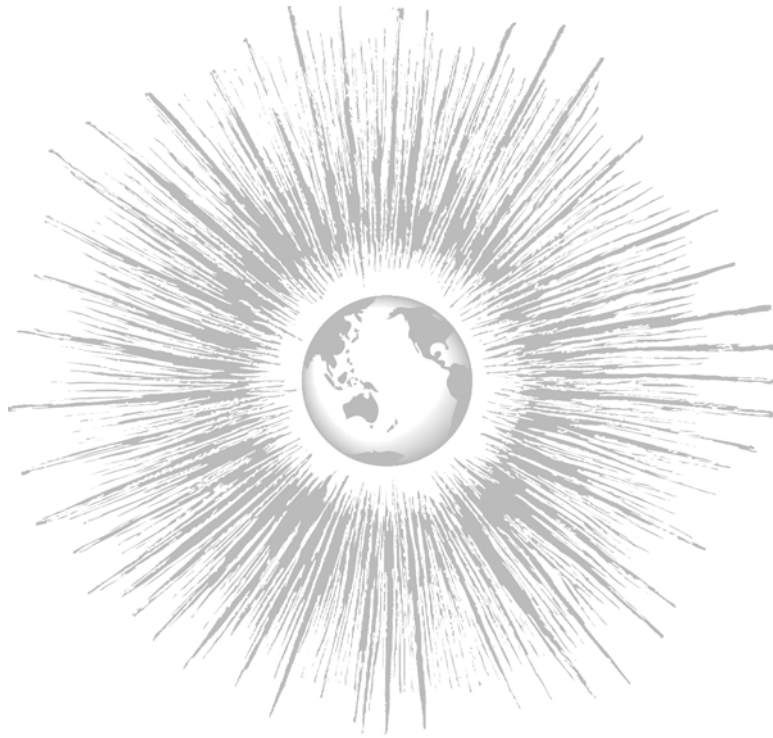


Marx and the Historical Ecology of Capital Accumulation on a World Scale: A Comment on Alf Hornborg's "Ecosystems and World Systems: Accumulation as an Ecological Process."*

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Alf Hornborg says many useful things in his article, "Ecosystems and World Systems: Accumulation as an Ecological Process." His effort to "ground the notion of capital accumulation in the physical realities of ecology and thermodynamics" is a much-needed corrective to nature-blind studies of capitalism. At a more paradigmatic level, his dismay at the "analytical disjuncture of ecology and economics" in modern social science is right on target (1998: 169). Yet, despite the article's laudable intent, Hornborg goes astray by imputing to Marx a focus on labor that excludes the "physical realities" of labor reproduction, world trade, or imperialism. Hornborg is right to urge a synthesis of ecological and economic studies, but wrong in his call to "supplement" the labor theory of value with a "resource-oriented...concept of exploitation" (1998: 173). Even if Marx did not grapple with a global ecological crisis of contemporary standards, he was remarkably sensitive to ecological processes as they shaped, and were shaped by, capital accumulation; indeed, Marx studied intensively the works of the leading soil chemists of his day, foremost among them Justus von Liebig. Particularly in the first and third volumes of *Capital*, Marx provides a compelling framework for comprehending the nature-society dialectic under capitalism. Far from demanding a turn to theoretical eclecticism, as Hornborg would have us do, Marx's holistic approach to the ecology of capital accumulation deserves to be

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developed by students of world-historical social change. This approach illuminates the ways in which capital accumulation, the exploitation of labor power and workers' agency, and ecological transformation are mutually relational and formative moments of world capitalist development.

Hornborg criticizes Marx for failing "to see that exploitation could also take the form of draining another society's natural resources." Moreover, Marx "put his faith...in the global, emancipatory potential of the industrial machine" (1998: 172). Marx's narrow focus on labor and industry prevented him from developing an analysis in which labor exploitation and resource exploitation are seen as two sides of the same (dialectical) coin.

Is this an accurate representation of Marx's analysis of the relationship between capitalism and the natural environment? I think not.

Far from failing to see the imperialist exploitation of natural resources, Marx accorded it a central place in his chapter on "the general law of capitalist accumulation" (1977: ch. 25): "Ireland is at present merely an agricultural district of England which happens to be divided by a wide stretch of water from the country for which it provides corn, wool, cattle, and industrial and military recruits" (1977: 860). In a footnote, he observes that "for a century and a half England has indirectly exported the soil of Ireland, without even allowing its cultivators the means for replacing the constituents of the exhausted soil" (ibid: n. 23).

Did Marx's focus on the development of large-scale industry blind him to the ecological transformations that followed in its wake? Hardly! This was the man who argued that the development of industrial capital "evinced itself in such energetic destruction of the forests that everything done by it conversely for their preservation and restoration appears infinitesimal" (1967: 244). Marx begins his discussion of the capitalist labor process with a discussion of the relationship between human labor and nature. "Labor is," Marx writes, "first of all, a process between man and nature" (1977: 283).

Marx takes this analysis much further. He places his analysis of the ecological destructiveness of industry at the conclusion of the chapter of "Machinery and Large-Scale Industry" (1977: ch. 15). This is no accident. For Marx, the simultaneous degradation of the worker and the soil is systematically connected by capitalism:

Capitalist production disturbs the metabolic interaction between man and the earth, i.e. it prevents the return to the soil of its constituent elements con-

sumed by man in the form of food and clothing; hence it hinders the operation of the eternal [sic] natural conditions for the lasting fertility of the soil...In modern agriculture, as in urban industry, the increase in the productivity and the mobility of labour is purchased at the cost of laying waste and debilitating labour-power itself. Moreover, all progress in capitalist agriculture is a progress in the art, not only of robbing the workers, but of robbing the soil; all progress in increasing the fertility of the soil for a given time is a progress towards ruining the more long-lasting sources of that fertility...Capitalist production, therefore, only develops the techniques and the degree of combination of the social process of production by simultaneously undermining the original sources of all wealth — the soil and the workers (Marx, 1977: 637-638).

In *Capital III*, Marx continues:

Large-scale industry and industrially pursued agriculture have the same effect. If they are originally distinguished by the fact that the former lays waste and ruins labour-power and thus the natural power of man, whereas the latter does the same to the natural power of the soil, they link up in the later course of development, since the industrial system applied to agriculture that enervates the workers there, while industry and trade for their part provide agriculture with the means for exhausting the soil (Marx, 1981: 950)

This was not only a national process of ecological transformation. Marx devotes a considerable portion of *Capital III* to the study of agriculture, ground rent, and relative soil productivity. Again he returns to the ecology of the town-country division of labor:

Large landed property reduces the agricultural population to an ever decreasing minimum and confronts it with an ever growing industrial population crammed together in large towns; in this way it produces conditions that provoke an irreparable rift in the interdependent process of social metabolism, a metabolism prescribed the natural laws of life itself. *The result of this is a squandering of the soil, which is carried by trade far beyond the bounds of a single country* (Marx, 1981: 949, emphasis added).

Hornborg calls for integrating economics and ecology, but what of sociology? The "accumulation process" is not merely the accumulation of capital and the transformation of the environment, it is the production of new social relations and new class forces. This neglect of agency is certainly not a weakness of Hornborg alone; it afflicts most studies of long-run, large-scale change (see Moore, 1997). It is, however, a weakness that flows from Hornborg's equation of capital with "material infrastructure" (1998: 173) —that is, a thing rather than a social relation. Just as Hornborg invites

us to consider how different, say, English history might have been without the natural resources of the periphery, we might consider how class struggles from below shaped British capitalist development. This world-historical connection between ecological degradation and class formation (and the ensuing class struggles) is no mere abstraction. Sidney Mintz (1986) perceptively notes that sugar was the crucial “drug food” of the industrial revolution, providing cheap, low-cost calories to the growing industrial proletariat in the 18th and 19th centuries. It is no secret that this sugar was grown on plantations that wreaked havoc with the natural environment. The environmental devastation effected by the sugar plantation system led to declining productivity throughout the early modern era, and continually spurred the expansion of the capitalist world-economy to new areas—from the Atlantic islands, to Brazil, to the small and then the large Caribbean islands. As a result, vast new supplies of labor power were necessary, which slave traders procured (Moore, forthcoming). The case of sugar shows how class formation in the core (the industrial proletariat) and periphery (slaves) on the one hand, and ecological transformation on the other, are closely bound moments of world scale capital accumulation.

Marx’s approach permits a holistic analysis which illuminates the dialectical connections between capital accumulation, the exploitation of labor power, and environmental degradation. From Marx’s perspective, the ceaseless accumulation of capital requires the ceaseless expansion of the proletariat (Harvey, 1982)—clearly a problematic necessity on a planet with fine boundaries and limits. The ceaseless expansion of the proletariat lowers the costs of doing business over the short run but raises them over the long run, as the options for non-wage income decline and workers’ bargaining power increases. As the wage bill rises, capitalists seek out new wage workers in the countryside. This is only possible by reorganizing agriculture along increasingly capitalist lines. In this way the endless accumulation of capital leads to the endless proletarianization of labor power, which in turn leads to the continual pressure to widen and deepen the division of labor between town and country. This growing rift between town and country has profound ecological consequences. As Marx argues forcefully, the capitalist separation of town and country undercuts the cycling of nutrients, thereby pushing local ecosystems to the breaking point. This “irreparable rift in the interdependent process of social metabolism” (Marx, op. cit.) has by the end of the 20th

century achieved new heights (Foster and Magdoff, 1998).

The problems of nutrient cycling under capitalism are exacerbated by the imperative to increase agricultural productivity, which is functionally necessary to feed the growing proletariat at a reasonable cost (lest high food prices drive up wages) and practically necessary for the direct producers, who must compete on the market. This rising agricultural productivity is achieved through “the radical simplification of the natural ecological order in the number of species found in an area and the intricacy of their interconnections” (Worster, 1990: 1101). Such radical simplification—or “specialization” in the language of bourgeois economics—is possible not only from the extension of the capitalist world market but equally through bitter class struggles, which Marx analyzes in terms of primitive accumulation (1977: Part VII). Once in place, such simplification—and intensification—of agricultural production is reinforced by the imperatives of capitalist competition. Never mind that the sharp increases in productivity achieved by capitalist agriculture are temporary, and that in the long run the rising costs of capital inputs and declining soil fertility begin to outweigh productivity increases.

Marx’s analysis of capital accumulation, labor, and the natural environment permits a holistic analysis which ties together the looming crises of world capitalism today—the deepening inequality between core and periphery, the growing militancy of workers’ movements, and the global ecological crisis. The theory of capital accumulation I am advocating illuminates how ceaseless capital accumulation necessitates the expansion and increased exploitation of the proletariat, which in turn necessitates the expanded and intensified exploitation of the natural environment through successive transformation of the world division of labor. It may be true that environmental destruction was a major cause of capitalist spatial expansion, but this is merely a shorthand way of saying that the *declining productivity of labor* on a given piece of sufficiently degraded land has begun to yield returns that are below the average rate of profit, and therefore uncompetitive in capitalist terms (Moore, forthcoming). In certain times and places, capital may be more interested in exploiting the natural environment than manufacturing commodities, but this hardly necessitates a concept of dual exploitation (labor and the environment) as Hornborg recommends. If two “concepts” of exploitation are justified, why not three, or five, or ten? Such theoretical

eclecticism will not do. Capital accumulation has many faces but only one logic—expand or die. It exploits the environment *only through* the exploitation of labor power. In so doing, capital has created the conditions for new kinds of working class social movements—such as the environmental justice movement (Bullard, 1993; Hofrichter, 1993)—that oppose this logic in its many forms.

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