THE CRISIS OF THE EARTH

Marx's Theory of Ecological Sustainability as a Nature-Imposed Necessity for Human Production

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Any systematic, forward-looking ecological vision must include three elements: (a) a theory of ecological crisis and its relation to human production; (b) a concept of sustainability as a nature-imposed necessity for production; (c) a vision of the transcendence of ecological crisis that establishes sustainability as a core part of any future society. All three elements are to be found in the work of Karl Marx. Marx's analysis of the crisis of the earth (or soil) in the mid-nineteenth century led him to a concept of sustainability that was central to his vision of communist society. Because this concept of sustainability was rooted both in a critique of capitalism and a vision of a future society, it has a richness and complexity all its own. A close examination of Marx's concept of sustainability therefore offers important insights into the possibilities for the creation of a more sustainable social order.

The rise in recent years of various forms of social theory attuned to ecological thought has meant major shifts within the different social scientific paradigms, each of which has sought to incorporate green concerns to some extent. In each case, this has involved the twofold task of rejecting much of previous social thought (as ecologically unsound or even exploitative) coupled with an attempt to build on the past, when possible. This twofold process associated with the reconstruction of social theory to take into account ecological necessity can be seen as taking place with unequal degrees of success within each of the great traditions of social theory, such as conservatism, liberalism, socialism, and feminism.

Some of the classic theorists whose work is being reevaluated (and in some cases reconstructed) in relation to ecological analysis include such thinkers as Plato (Hughes, 1975, pp. 58-63; Ponting, 1991, pp. 76-77), Francis Bacon (Leiss, 1974, pp. 45-71; Merchant, 1980, pp. 164-191), Thomas Hobbes (Ophuls, 1973), Edmund Burke (Ophuls & Boyan, 1992, pp. 294-295), Thomas Malthus (Catton, 1982, pp. 126-129), David Ricardo (Barnet & Morse, 1963, pp. 51-71; Weisskopf, 1996, p. 384), Jeremy Bentham (Ferry, 1995, pp. 26-27), Charles Fourier (Roelofs, 1996), John Stuart Mill (Daly, 1996, pp. 3-7), W. S. Jevons (Georgescu-Roegen, 1971, pp. 295-304), A. C. Pigou (de Steiguer, 1997, 51-59), Charlotte Perkins Gillman (Mellor, 1992, pp. 252-257), Max Weber (Murphy, 1994), and Mahatma Gandhi (Guha, 1995).

No single thinker, however, has generated greater interest and controversy in this connection than Karl Marx. The literature on Marx and the environment is voluminous—far outstripping that of any other thinker—reflecting the wide range

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of disagreement, the theoretical complexity of the issues involved, and—above all—the high stakes associated with the ecological evaluation of Marx's thought.

Marx remains the preeminent critic of contemporary capitalist society, and the extent to which his critique (and that of various traditions that he spawned) can be integrated with an ecological critique of machine capitalism is not a minor issue within social theory. As with other great social theorists, this involves more than a question of political correctness (evaluated in green terms). What is really at issue is whether Marx's critique of political economy plays an essential part in the reconstruction of social theory in an age of planetary ecological crisis. Furthermore, to what extent does he offer direct ecological insights that are crucial to the solution of the contemporary ecological crisis?

Not surprisingly, there are three distinct positions that have arisen among environmentalists on Marx and ecology. The dominant position, associated with mainstream liberal social thought (insofar as it considers environmental issues) and much post-Marxist thought (especially those who have converted to liberalism from the official Marxism of the former Soviet bloc), is that Marx represented in many ways the most extreme case of an antienvironmental perspective. In this perspective, no distinction is made between Marx's approach to nature and the destructive ecological practice implemented by Soviet-type societies (see Clark, 1989; Ferkiss, 1993, pp. 105-118).

A more nuanced view associated with much of contemporary left and ecosocialist thinking argues that Marx (1974) demonstrated ecological sensitivity at various points in his work, especially in his early writings, most notably the *Economic and Philosophic Manuscripts of 1844*, but that he ultimately gave way to a so-called Promethean attitude that gloried in the technological domination of nature, excluding ecological problems from his analysis (Benton, 1996; Giddens, 1981, pp. 59-60; Merchant, 1994, p. 2; Schmidt, 1971). These theorists, along with those who adopt the first position, commonly allege that Marx denied any intrinsic value to nature within his theory of value and wealth (Brown, 1995, pp. 171-173; Churchill, 1996, pp. 467-468; Deléage, 1994, p. 48). Yet, according to this view, it is still possible to "green Marx" and Marxism; indeed, it is often argued that Marx's critique of political economy, when "greened" in this way is an essential part of the general ecological critique of capitalist society (Benton, 1996; Soper, 1996).

A third interpretation, also associated with the Left and ecosocialism, argues that Marx had important direct insights into the ecological problem that were systematic in character, that these insights were profound both in his day and ours, and that they constitute a necessary—but not sufficient—basis for a general ecological critique of capitalist economy, one that is dialectically connected to his larger socioeconomic critique of capitalism (Altvater, 1993, pp. 181-233; Burkett, 1996, 1997; Foster, 1997a; Harvey, 1996, pp. 120-175; Parsons, 1977).

The development of this wide-ranging debate on Marx and ecology has gone hand in hand with the unearthing of a vast, if somewhat scattered, set of writings by Marx and Engels on ecology, making it apparent—even to those strongly critical of Marx from an ecological standpoint—that his insights in this area were not meager by any standard. The most influential text in this regard has been Howard Parsons's *Marx and Engels on Ecology* (Parsons, 1977), a widely referenced collection of excerpts of Marx's (and Engels's) more ecological statements. The influence of Parsons's text has been twofold. On one hand, it has convinced even many skeptics that Marx and Engels were deeply concerned about ecological issues and commented—often in a penetrating way—on a wide variety of ecological problems, including pollution of air, water, and land; urban waste and congestion;

industrial poisoning; the degradation of the soil; the annihilation of forests; destruction of species; the need for conservation and recycling; the illusion of the conquest of nature; and the antagonism of town and country. On the other hand, these numerous ecological passages, unearthed by Parsons, are frequently treated as isolated insights unconnected to the larger character of Marx and Engels's thought. The very fact that major commentators feel that it is sufficient to refer to Parsons's collection of excerpts, and that it is therefore unnecessary to look at the context in which these ideas arise in Marx and Engels's thought, is indicative of the way in which these insights are viewed—as mere "illuminating asides" (Goldblatt, 1996, p. 5).

The burden of proof for those who argue that Marx (and Engels) made major direct contributions to the understanding of the ecological problem is precisely to show that the specific context in which such statements appear in his thought is important and that Marx had an analysis of ecological problems that was systematic in character. Moreover, it is necessary to establish—from this point of view—that the type of analysis of environmental (and not simply social and economic) issues that Marx provided is crucial if we are to ascertain the nature of our contemporary ecological dilemma.

Moreover, Marx's ecological analysis is only of significance to the extent that it is connected to his larger critique of political economy. The nature of this critique can be briefly summarized in terms of four major characteristics: (a) its historical character, (b) its materialist premises, (c) its emphasis on the distinction between qualitative-quantitative relations of production, and (d) its conception of human emancipation as a transcendence of alienation (or the negation of the negation). For Marx, as Paul Sweezy (1970) has written, "The specific historical (i.e., transitory) character of capitalism is a major premise" (p. 22). Unlike the classical liberal political economists of his day (whose viewpoint in this respect is still dominant in our own time) Marx saw capitalism as a phase of development within a historical process—not as the end point in history. In any historical analysis of capitalism, the concept of systemic crisis is essential because it suggests that at certain points, the system is confronted by its own limitations and the need for social transformation. The materialist premise of Marx's analysis lay in the assumption that productive relations and human praxis were the ultimate grounds for the constitution of society at any given phase of development. In distinguishing between the qualitative and quantitative aspects of productive relations, Marx highlighted the contradiction, respectively, between use value (the natural-material character of production common to all human societies, or to production in general) and exchange value (the quantitative value relations of a specifically capitalist society geared to profit). Finally, in stressing the negation of the negation, or the positive transcendence of the alienated condition of contemporary commodity society, Marx argued that there were contradictory tendencies internal to present society, manifested in forces for revolutionary change, that pointed toward the creation of a future society in which use values and useful labor would play the predominant roles within the context of a society geared to the full development of the rich diversity of human needs (Mészáros, 1970, pp. 146-161).

So far, work advancing the third position—arguing that Marx made strong, direct contributions to an ecological critique of capitalism and that this was connected to his larger critique of political economy in the above sense—has followed two tracks, which can be viewed as complementary. One of these has focused on what might be called the deep structure of Marx's political economy—his value-based critique (Altvater, 1996, pp. 181-233; Burkett, 1997). The other has concentrated

on the more historical level of inquiry, looking at Marx's direct analysis of ecological degradation and its connection to issues of crisis and sustainability (Foster, 1997a; Perelman, 1996). The complementarity of the two tracks lies in the fact that both insist on treating human-material production as simultaneously social and material (natural). Both agree that it is the conflict between its specific social form, manifested in the dominance of value (exchange value), and its more general material conditions, as manifested in the metabolic relation between nature and human production (use value), that constitutes the chief contradiction of capitalist society and the source of its organic crisis (Burkett, 1996, pp. 57-63; Mandel, 1975, pp. 575-578; Rader, 1979, pp. 186-198). What distinguishes the two tracks, then, is not any fundamental difference in outlook but merely that the first track (operating at a higher level of abstraction) emphasizes the contradictions that arise in the value form, whereas the second (operating at a lower level of abstraction) focuses on the organic unfolding of the crisis in terms of what Marx called the "material exchange [metabolic interaction] between man and nature" (Marx, 1975, p. 209; Sheasby, 1997). It is the latter approach that will be developed in the essay that follows, though much of the argument presupposes—and indeed is ultimately inseparable from—the deeper critique of capitalist value relations.

More specifically, the following analysis will attempt to argue three points related to the systematic character of Marx's ecological analysis: (a) that Marx can be said to have developed a specific (though not all-encompassing) theory of ecological crisis under capitalism; (b) that this theory of ecological crisis led him to a concept of sustainability as a nature-imposed necessity for human production (though one that took different forms at different stages of human development); and (c) that this notion of sustainability played a crucial part in his conception of a future communist society. All three elements—it is crucial to understand—are necessary to establish that Marx did indeed have a systematic, forward-looking ecological vision. No environmentalism can be said to be systematic without some concept of ecological degradation. An ecological viewpoint without a concept of sustainability has no genuine usefulness in environmentalist terms. Finally, an ecological vision—properly considered as such—must include some sense of social possibilities that transcend rampant ecological degradation and establish sustainability as a core part of the social matrix in any future society. It is precisely the development of these three connections (and their dialectical insertion within Marx's larger critique of political economy), it will be argued here that constitutes the basic framework of Marx's ecological analysis. Not only does Marx's ecological critique of capitalism have much to offer in itself, but it demonstrates—more than in the case of any other single theory—what is necessary to develop a fully articulated ecological critique of our present-day society.

MARX'S EARLIEST ECOLOGICAL VISION

It is well known that Marx's earliest critique of capitalism (and advocacy of communism) (Marx, 1844) was governed by a critique of the alienation of nature under capitalism—both in terms of the alienation of human nature (or species being) and the alienation of nature as the external body of humanity. Communism was presented by Marx as the negation of this negation and thus as the emergence of a world in which naturalism and humanism were no longer opposed but each presupposed the other. As Marx himself (1974) put it, "Communism is . . . the *genuine* resolution of the conflict between man and nature, and between man and man." As nonalienated "society [it] is therefore the perfected unity in essence of

man with nature, the true resurrection of nature, the realized naturalism of man and the realized humanism of nature" (pp. 348-350; see also Mellor, 1997).

At the root of Marx's analysis was the notion of nonalienated labor as the means of both human self-realization and of the positive affirmation of the dialectical interconnection and interdependence of humanity with nature. "Man *lives* from nature, i.e. nature is his *body*, and he must maintain a continuing dialogue with it if he is not to die. To say that man's physical and mental life is linked to nature simply means that nature is linked to itself, for man is a part of nature" (Marx, 1974, p. 328). As Marx (1973) later elaborated on this point, it was not "the *unity* of living and active humanity with the natural, inorganic conditions of their metabolic exchange with nature which needs to be explained, but rather the *separation* between these inorganic conditions of human existence and this active existence, a separation which is completely posited only in the relation of wage labour and capital" (p. 489).

For Marx (1974), alienation under capitalism was the "*universal* prostitution of the worker" (pp. 359-360), which meant the violation of both the natural essence of man and the human essence of nature. Such abasement of all that was human and natural had its counterpart in "the universal pollution to be found in large towns." There,

> man reverts once more to living in a cave, but the cave is now polluted by the mephitic and pestilential breath of civilization. Moreover, the worker has no more than a precarious right to live in it, for it is for him an alien power that can be daily withdrawn and from which, should he fail to pay, he can be evicted at any time. He actually has to *pay* for this mortuary. . . . Light, air, etc.—the simplest *animal* cleanliness—ceases to be a need for man. *Dirt*—this pollution and putrefaction of man, the *sewage* (this word is to be understood in its literal sense) of civilization—becomes an *element of life* for him. Universal *unnatural*, putrefied nature, becomes an *element of life* for him. (pp. 359-360)

The ecological character of Marx's vision at this stage of his thought is undeniable. Nevertheless, some critics of Marx, such as Anthony Giddens (1981), claim that these passages, which suggest that "nature is more than a medium through which human history unfolds" are mostly confined to Marx's "early writings" and that in his overall work, a " 'Promethean attitude' " in which nature is treated simply in instrumental terms "is pre-eminent" (pp. 59-60). For Giddens, Marx is to be criticized because "his concern with transforming the exploitative human social relations expressed in class systems does not extend to the exploitation of nature" (p. 59; for a critique, see Foster, 1997a).

Yet, both of Giddens's (1981) claims—(a) that Marx's more ecological conception of nature was confined to his early writings, and (b) that he refused to incorporate the notion of the exploitation of nature into his analysis—are easily contradicted by Marx's single, best known, most prominent statement on ecological issues: his passage on the destruction of the soil in the first volume of *Capital* (1976), "All progress in capitalist agriculture," Marx wrote,

> is a progress in the art, not only of robbing the worker, but also 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. The more a country proceeds from large-scale industry as the background of its development, as in the United States, the more rapid is this process of destruction. 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 worker. (p. 638)

Such statements make it clear that Marx, at least on occasion, extended his critique of capitalism to the exploitation of the soil. But it still might be argued that this well-known passage simply represented an isolated insight within Marx's thought, unconnected to his larger system. However, anyone familiar with the nature of Marx's thought should view this as improbable at the outset. As the great conservative economist Joseph Schumpeter (1942) noted, what distinguished Marx's political economy from all others was that all of those historical and social factors that liberal economists (and social scientists) were wont to classify as mere "disturbing factors" were embraced within Marx's synthesis as historical variables, with the effect that Marx's synthetic vision was aimed at the totality of society (p. 47). The prominent underscoring of particular historical observations, later to be discarded, is as uncharacteristic of Marx's thought as it is characteristic of social science in general.

But if this is true, how is Marx's analysis of the exploitation of the earth or soil to be understood in relation to his thought in general? This is a question that can (in conformity with Marx's method) be viewed at two different levels of abstraction—one directed at the value-based analysis at the heart of his critique of political economy, and the other at the more concrete historical level of analysis in his work. It is the latter approach that will be emphasized in what follows. (For an example of the former see Burkett, 1997.)

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From the very first, Marx and Engels based their critique of bourgeois political economy on a concrete refutation of its three principal emphases: the analysis of the extraction of surplus product from the laborer; the related theory of capitalist ground rent; and the Malthusian theory of population, which connected the two to each other. The relation of human beings to the earth (or soil) was never peripheral in this conception; rather, it was an issue that Marx and Engels returned to at each point of their analysis and that increasingly preoccupied Marx, who viewed it as the ultimate ground of his critique of political economy and of the necessity of communism. "To make the land an object of huckstering—the land which is our one and all, the first condition of our existence," the 23-year-old Engels wrote (1843/1964), "was the last step towards making oneself an object of huckstering" (p. 210).

As part of their general critique of the Malthusian and Ricardian notions of overpopulation (which argued that population would rise faster than food supply) and of the origins of ground rent (the thesis that land of more and more marginal fertility was being brought into cultivation, and that this explained the origin of ground rent, which was charged for use of the more fertile soils), Marx and Engels early on developed an analysis of the antagonistic division of labor between town and country, emphasizing the irrational character of the metabolic relation of industry and the exploitation of the soil under capitalism (Marx & Engels, 1975a, Vol. 5, pp. 64-65).

Hence, at each critical point in the development of his critique of political economy in *Capital*—in the section on large-scale industry and agriculture at the end of his chapter on machinery and large-scale industry; in his discussion of primitive accumulation at the very end of the first volume (Marx, 1976), including

the chapter on "Modern Theory of Colonialism" with which the first volume closed; and in Part 6 of Volume 3 (Marx, 1981) on "Transformation of Surplus Profit into Ground Rent" (200 pages in length)—Marx underscored the importance of these issues. Moreover, it was precisely these issues—of the capitalization of agriculture and its negation—that seemed to have most preoccupied him in the last stage of his intellectual career (the period that Shanin, 1983, has dubbed "late Marx") as he sought to develop an analysis of the possibilities offered by the vestiges of communal agriculture in Russia. More and more, Marx was driven to an analysis of communism that emphasized sustainability, leading him to develop one of the first and most comprehensive analyses of this concept. Much of this perspective was apparent in the work of Engels as well, evidenced, for example, when Engels (1975) made connections between such factors as urban pollution, housing, and the destruction of the original metabolic relation between human beings and the soil.

What led Marx in the direction of a concrete examination of the relation between the development of industry and the exploitation of the soil (aside from a desire to overturn the whole Malthusian-Ricardian doctrine) was an awareness of a developing ecological crisis, one generating widespread concern in the early to mid-nineteenth century, and independent of the better known demographic problem associated with Malthusianism. This was the crisis of the earth or soil as propounded in the work of the great soil chemist Justus Liebig and connected to political economy via the work of the U.S. political economist Henry Carey.

The importance of Liebig's work (which was contemporaneous with that of Marx and Engels) cannot be overemphasized. Liebig is referred to in *Outlines of a Critique of Political Economy* (Engels, 1964) and is cited extensively in both the first and third volumes of *Capital* (Marx, 1976, 1981), as well as in *The Housing Question* (Engels, 1975). Marx and Engels were impressed by the scientific developments in agronomy in their time and stressed the importance of this for the rational cultivation of the soil under communism. As Marx (1963) stated, "Fertility is not so natural a quality as might be thought; it is closely bound up with the social relations of the time" (cited in Marx & Engels, 1975a, vol. 6, p. 204).

Hence, Marx and Engels's 10-point program for the implementation of communism (Marx & Engels, 1967) included not only "1. Abolition of property in land and application of all rents of land to public purposes" and "9. Combination of agriculture with manufacturing industries; gradual abolition of the distinction between town and country, by a more equable distribution of population over the country" but also "7. . . . the improvement of the soil generally in accordance with a common plan" (pp. 40-41).

Still, until the early 1860s, Marx thought that the progress of capitalist agriculture might be so rapid that it would outpace industry and spoke complacently of the "general increase in fertility that accompanies the development of society" (Marx & Engels, 1975a, Vol. 38, p. 262).

By the mid-1860s when the first volume of *Capital* (1976) was published, however, Marx's understanding of the crisis of the earth or soil—as a result of his studies of Liebig and other agronomists—had caused him to reverse this view. For Marx, it was Liebig who had offered an explanation for the crisis of agricultural productivity—one far more realistic than the Ricardian notion that diminishing productivity in agriculture arose from the cultivation of ever less productive land. "Large landed property," Marx (1981) explained at the end of his analysis of capitalist ground rent in the third volume of *Capital*,

> 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 by the natural laws of life itself. The result of this is a squandering of the vitality of the soil, which is carried by trade far beyond the bounds of a single country. (Liebig) (Marx, 1981, p. 950)

Liebig argued in his later writings that the "empirical agriculture" of the trader gave rise to a "spoliation system" in which the "conditions of the reproduction" of the soil were violated. Soil nutrients (such as nitrogen, phosphorous, and potassium) were "carried away in produce, year after year, rotation after rotation." Both the open system of exploitation of American farming and the so-called high farming of European agriculture were thus forms of "robbery." "Rational agriculture," in contrast, would give "back to the fields the conditions of their fertility" (Liebig, 1859, pp. 171-183, 220).

Liebig's argument, it should be noted, contained both an ecological and an economic component. The former was reflected in his analysis of the spoliation system and his arguments against "latifundist agriculture and in favor of a ruralized urbanism" (Martinez-Alier, 1990, p. 40). But Liebig's emphasis on the replacement of soil nutrients also gave a boost to the fertilizer industry, which promised bigger and bigger agricultural yields through an unlimited increase in chemical inputs—and it is in this connection unfortunately that he is best remembered (Martinez-Alier, 1990, p. 41).

Both Liebig and, more indirectly, Marx were influenced by the arguments of the U.S. political economist Henry Carey. It was Carey (1858) who introduced the notion that the robbing the earth of its fertility was connected to the transportation of the elements of the soil over hundreds and even thousands of miles in a country such as the United States and even further when foreign trade was involved. The transportation of manure for the restitution of the soil meanwhile came up against natural and economic barriers. " 'The question of economy,' " Carey quoted an "eminent agriculturist" as saying,

> should be, not how much do we annually produce, but how much of our annual production is saved to the soil. Labor employed in robbing the earth of its capital stock of fertilising matter, is worse than labor being thrown away. In the latter case, it is a loss to the present generation—in the former, it becomes an inheritance of poverty for our successors. Man is but a tenant of the soil, and he is guilty of a crime when he reduces its value for other tenants who are to come after him. (p. 55)

As Carey himself put it, "what with our earth-butchery and prodigality, we are each year losing the intrinsic essence of our vitality" (p. 54).

These problems were by no means of a purely abstract nature but were a manifestation of what O'Connor (1996) has called the *second contradiction of capitalism* as it manifested itself most clearly in Marx's day. In undermining the conditions of production (and reproduction) of the soil, the burgeoning capitalist economy threatened its own reproduction. As Marx said (in Marx & Engels, 1975b), agriculture "when it progresses spontaneously and is not *consciously controlled* . . . leaves deserts behind it" (p. 190). In the United States, agricultural productivity declined dramatically in the early nineteenth century in both New England and the slave South. In Europe, farmers, in their desperation, gathered bones from

the great European battlefields (Waterloo, Austerlitz) to fertilize their crops. The depletion of soil nutrients in the nineteenth century led to the first developments in artificial fertilizer production in the early 1840s with the introduction by the English agricultural chemist John Bennet Lawes of a process for deriving phosphorous from phosphate rocks and the building of the first fertilizer factory. Huge natural phosphate deposits (marine phosphates) to be found in such places as Nauru island and Ocean Island in the Pacific were another source. Soluble forms of potassium were readily available in geological deposits and could be mined directly. But the stumbling block was fertilizer nitrogen. During the nineteenth century, the main sources of nitrogenous fertilizer were the saltpeter (sodium nitrate) deposits of Chile and the guano (accumulated dung of seabirds) deposits of Peru and elsewhere. In 1850, imported guano accounted for more than 40% of the commercial fertilizer used in the United States.

So desperate was the condition of capitalist agriculture in this period that the mid-nineteenth century saw a frantic search for guano throughout the world and the rise of a period of guano imperialism. The first great overseas colonial expansion of the United States was a direct outgrowth of this crisis of the conditions of production in agriculture. Under the authority of the Guano Island Act, passed by Congress in 1856, U.S. capitalists seized 94 islands, rocks, and keys around the globe between 1856 and 1903, 66 of which were officially recognized by the U.S. Department of State as U.S. appurtenances. Nine of these guano islands remain U.S. possessions today (Craven, 1965; Davis, 1973, pp. 253-265; Hillel, 1991, pp. 129-132; Merchant, 1989, pp. 186-188, 196-197; Skaggs, 1994; Smil, 1990, pp. 425-431).

Synthetic nitrogen fertilizer was not developed until 1913 when the German chemist Fritz Haber (who was to go on and pioneer in the development of explosives and nerve gases for war production) originated such a process. By the end of the nineteenth century, however, it was already evident that the development of synthetic fertilizers was doing much to reduce the crisis of the depletion of the soil in agriculture. Nevertheless, the main impact of this from an ecological standpoint was simply to shift the second contradiction from tap to sink. This was emphasized by Karl Kautsky in his great work, *The Agrarian Question* (1899/1988), which was inspired by Marx and Liebig. Kautsky argued that artificial fertilizers

> allow the reduction in soil fertility to be avoided, but the necessity of using them in larger and larger amounts simply adds a further burden to agriculture—not one unavoidably imposed on nature, but a direct result of current social organization. By overcoming the antithesis between town and country . . . the materials removed from the soil would be able to flow back in full. Supplementary fertilisers would then, at most, have the task of enriching the soil, not staving off its impoverishment. Advances in cultivation would signify an increase in the amount of soluble nutrients in the soil without the need to add artificial fertilisers. (p. 215)

Kozo Mayumi—a Japanese ecological economist who studied with Nicholas Georgescu-Roegen, the founder of modern ecological economics—has made a strong case that Liebig and Marx had "prophetic visions" of land deterioration that pointed toward the kind of synthesis of economics with the entropy law that was later to characterize ecological economics (Mayumi, 1991; Georgescu-Roegen, 1971). One implication of this analysis (as already seen via Kautsky, 1899/1988) is that the introduction of artificial fertilizers and other chemicals could only provide "temporary emancipation from the land," which would require ever larger

material inputs to compensate for the intensive exploitation of the soil, a trait of modern agribusiness that has been dramatically documented in the work of Barry Commoner (1971). Thus, between 1949 and 1968, U.S. agricultural production increased by 45%, whereas the annual use of fertilizer nitrogen increased by 648%. This increased use of fertilizer nitrogen has contributed to the pollution of lakes, streams, rivers, and groundwater (p. 149).

Yet, what is most important for our discussion here is the fact that Marx clearly recognized, and indeed was more and more preoccupied with, the ecological crisis of the capitalist economy, as manifested in the destruction of the conditions of reproduction of the soil in his day. This pushed his analysis toward a concern with sustainability, which was to give a more ecological character to his conception of communism.

MARX AND ECOLOGICAL SUSTAINABILITY

Although Marx was clearly concerned with the nineteenth-century destruction of the soil and other ecological problems present in his time, it would clearly be wrong to suggest that such ecological concerns were at the very core of his theory of capitalist crisis. Marx, who tended toward revolutionary optimism, believed that capitalism would be replaced by a society of freely associated producers—its demise speeded along by its own internal political-economic contradictions—long before the kinds of ecological problems that he observed could become truly critical. Marx's thought did not, however, stop with the political-economic critique of capitalism in this sense. He was concerned about issues of ecological sustainability, not so much in relation to capitalism, but in relation to the future society of freely associated producers with which he identified—that is, communism itself (Ollman, 1979, pp. 56-57). His frequent references to the necessity of sustainability in the human relation to the earth are therefore directed at working out a fundamental distinction between communism and capitalism.

Sustainable development has been defined most influentially by the Brundtland Commission as "development which meets the needs of the present without compromising the ability of future generations to meet their needs" (World Commission on Environment and Development, 1987, p. 43). It was sustainability in this sense of the needs of future generations that was integral to Marx's (1981) conception of the crisis of the earth under capitalism and of the prerequisites for the advent of communist society. As he put it, "The way that the cultivation of particular crops depends on fluctuations in market prices and the constant change in cultivation with these price fluctuations—the entire spirit of capitalist production, which is oriented towards the most immediate monetary profits—stands in contradiction to agriculture, which has to concern itself with the whole gamut of permanent conditions of life required by the chain of successive generations" (p. 754).

For Marx, who understood that transcending the ecological crisis of capitalist agriculture was an absolute necessity for communist society, the question of sustainability was central to the future development of humanity. The "conscious and rational treatment of the land as permanent communal property," he wrote, is "the inalienable condition for the existence and reproduction of the chain of human generations" (Marx, 1981, pp. 948-949). Likewise, Engels, basing himself on Liebig, argued that one could view as a natural necessity the "demand . . . that man shall give back to the land what he receives from it" (Engels, 1975, p. 92). In this sense, ecological sustainability could be viewed as a nature-imposed necessity for human production.

This way of thinking about the crisis of the earth or soil led Marx (1981) to a consideration of the relationship of human beings to the entire planet:

> From the standpoint of a higher socio-economic formation, the private property of particular individuals in the earth will appear just as absurd as the private property of one man in other men. Even an entire society, a nation, or all simultaneously existing societies taken together, are not owners of the earth, they are simply its possessors, its beneficiaries, and have to bequeath it in an improved state to succeeding generations, as *boni patres familias* [good heads of the household]. (p. 911)

This point of view took on a more central role in Marx's analysis at the end of his life, as a result of his inquiries into the revolutionary potential of the archaic Russian commune, which he hoped could be expanded into a developed system "organized on a vast scale and managed by cooperative labor" through the introduction of modern "agronomic methods." Such a system of agricultural production, he argued, would be "in a position to incorporate all the positive acquisitions devised by the capitalist system" without falling prey to the exploitative nature (in relation to both human beings and the soil) of the latter (Marx & Engels, 1975a, Vol. 24, p. 356).

There are a number of elements, then, that characterize all of Marx's (1981) discussions of sustainability. First, sustainability relates to the permanent conditions of life or of reproduction that are required by the chain of successive generations. For Marx, this is a universal metabolic condition of the interaction of human society and nature. Second, even all human beings and all societies put together are not owners of the globe (ownership of parts of which is just as absurd as human slavery) but its possessors and beneficiaries, responsible for bequeathing it in an improved state for those who come after. Sustainability thus requires conservation and stewardship of the earth, according to the rational principles of good heads of households. Third, capitalism, because it is geared to short-term acquisition of wealth based on market prices, is ill-suited to play such a role, which requires production on a communal basis. Fourth, long-distance trade, which has developed along with modern large-scale industry, is itself an impediment to the maintenance of the naturally given relations of interdependence between nature and society and especially of agricultural productivity. A systematic robbing of the vitality of soil, as has occurred under the force of capitalist development, undermines both the natural laws of life and the conditions of production themselves. Fifth, this whole process is bound up with the proletarianization of the rural agricultural worker and the removal of urban workers from any connection to the land, a phenomenon that marks the growing antagonism of town and country. Sixth, the dialectical transcendence of this contradiction between town and country—which is only possible under communism—requires a shift away from capitalist forms of ownership and exploitation, along with the development of a society of freely associated producers. Finally, such changes are only possible if combined with the modern agronomic techniques, represented by the work of such figures as Liebig, that have emerged (but which are never fully implemented) under capitalism. For Marx, sustainability is never a mere technical problem but requires for its implementation a transformation in social formations and forms of appropriation.

SUSTAINABILITY AND MARX'S COMMUNISM

It is against this background that we can more fully understand Marx's vision of a society of freely associated producers, a socialist commonwealth. There were a number of elements that made up Marx's complex vision of communist society. Among these were revolutionary changes, not only in productive relationships as such but also in political organization, the family, principles of right (or justice), and so forth. Perhaps the two most important changes that Marx associated with communism—changes from which all others were derived—were a shift to collectivism and an alteration in the relationship between human beings and nature, accompanying (and in some ways defining) the changing productive relationships that communism could expect to bring about. It is in this sense that we can speak of an ecological vision that permeated Marx's conception of communism. This ecological vision became more rather than less important in his later work as concerns regarding the degradation of the earth (soil) under capitalism led him to a conception of sustainability that stood out in his time and remains remarkable even in our own.

It is well known that Marx's vision of communist society entailed (a) the development of collectivist forms of work organization (already existing in the womb of capitalist society as a result of the growing socialization of labor); (b) a shift away from a detailed to a social division of labor (with workers enjoying the latitude of pursuing multiple forms of creative activity); (c) the promotion of noninstrumental ends, whereby personal free time would be enormously expanded in which to cultivate individual needs of self-development, including intellectual development, disassociated from mere material consumption and gratification; (d) a radical change in principles of justice ("from each according to his ability, to each according to his need"); (e) the withering away of hierarchical state structures imposed on society and the promotion of proletarian democracy along the lines pioneered by the Paris Commune; (f) the dissolution of the bourgeois monogamy in favor of a family bound together by love relationships (in which one exists only insofar as one exists for others as well as oneself); as well as (g) the various means by which these ends would be achieved—such as nationalization and rational planning (Avineri, 1971, pp. 220-239; Burkett, 1997, pp. 170-173; Chattopadhyay, 1992; Marx, 1971, p. 18; Ollman, 1979, pp. 48-98). Less well known is the extent to which Marx's vision incorporated ecological elements, such as the abolition of the antagonism between town and country and the preservation of conditions of production (especially the fertility of the soil), for the sake of future generations. Yet, Marx's vision only has coherence when understood in terms of this larger principle of sustainability (to which even development must give way).

It is clear in examining Marx's (1981) conception of communism that collectivism, equality, free time, individual self-development, justice, democracy, and genuine love relationships, as he conceived them—as well as nationalization and rational planning—have no meaning outside of the concept of sustainability—which strikes right at the core of what he termed "the entire spirit of capitalist production . . . immediate monetary profits" (p. 754). Fundamental to Marx's vision was a rejection of instrumentalist self-aggrandizement as the basic principle of economic and social organization. As Paul Burkett (1997) has stated, "The expansion of free time and collective-democratic control over the social use of the conditions of production in Marx's communism" establishes the fundamental basis for sustainability in social and ecological relationships because it creates "condi-

tions conducive to noninstrumental valuations of nature (i.e., to the further development of ecological needs and capabilities among the society of producers)" (p. 172). Communism, for Engels (1940), was a society in which people "would not only feel, but also know, their unity with nature" (p. 293).

Marx, as Ollman (1979) has noted, proposed a higher synthesis in the relation between town and country that appeared "to involve moving some industries to the country as well as greatly expanding the amount of unencumbered land inside cities for parks, woodlands, and garden plots. I suspect, too, that Marx would like to see the number of people living in any one city reduced, and more small and medium size cities set up throughout the countryside" (pp. 56-57). In opposition to both the division of labor and what might be called the division of nature under capitalism, Marx (1963) quoted Lemontey approvingly: "Each of us plants his hedge and shuts himself up in this enclosure. I do not know whether by this parcellation the world is enlarged, but I do know that man is belittled" (p. 144; on the division of nature, see Foster, 1994, pp. 118-124). Above all, Marx (1981) insisted that "the capitalist system runs counter to a rational agriculture, or . . . a rational agriculture is incompatible with the capitalist system (even if the latter promotes technical development in agriculture) and needs either small farmers working for themselves or the control of the associated producers" (p. 216).

The close connection between Marx's vision of communism and ecological sustainability is evident in the utopian conceptions of the acclaimed nineteenth-century English artist, master craftsperson, designer, poet, and socialist activist William Morris, who was not only a firm advocate of Marxian socialism but also one of the formative green thinkers in the English context. In his celebrated utopian novel *News from Nowhere*, Morris (1962) described a society in which the overthrow of the World Market had led to the demise of wasteful forms of economic production geared to "artificial necessities" for the sake of profit, and the subsequent reorganization of production in such a way that "nothing can be made but for genuine use" (p. 267). Free time for the pursuit of intellectual inquiry and independent craftsmanship was more readily available—because society had given up its narrowly defined, instrumentalist ends—whereas work itself was seen as serving the needs of both human creativity and the fulfillment of social needs. In this postrevolutionary utopian social order, "the difference between town and country grew less and less." People had flocked from town to country but "yielded to the influence of their surroundings, and became country people"—with the population of the country more numerous than that of the towns (p. 244). England in the nineteenth century, it was explained, had become "a country of huge and foul workshops and fouler gambling-dens, surrounded by an ill-kept, poverty-stricken farm, pillaged by the masters of workshops. It is now a garden, where nothing is wasted and nothing is spoilt, with the necessary dwellings, sheds, and workshops scattered up and down the country, all trim and neat and pretty" (p. 245). The existence of this garden did not, however, preclude the preservation of wilderness areas, which were maintained for their intrinsic value. Population, meanwhile, had stabilized and been spread about (p. 246).

Morris's (1962) utopia, which was so closely connected to Marx's concept of communism, allows us to picture just how intertwined the issue of ecological sustainability is with the creation of a rich, many-sided society in which sustainability of human and natural relationships—rather than the mere pursuit of wealth for its own sake—has become the central principle of social organization. Without such a principle, none of Marx's other conceptions with regard to communism make

any sense; with it, the main distinction between communism and capitalism—as envisioned by Marx (1976)—becomes evident. Under a society geared to sustainability, no longer is it true that "Accumulate, accumulate . . . is Moses and the prophets" (p. 742).

The power of Marx's conception of a future society after capitalism is revealed perhaps most fully in his conception of wealth. Wealth for capitalism, Marx emphasized, is a mere quantitative, exchange value relation. From a capitalist standpoint, use values are only of importance insofar as they are necessary for the promotion of exchange value or profit for the capitalist. The conception of the wealth of nations as emanating simply from the law of value specific to capitalism, from relations of exchange value rather than use value, according to Marx, leads to the mistaken notion that labor is the sole source of wealth (or to the even more reified notion that capital equals wealth). Yet, as Marx (1875/1971) retorted in his single most important discussion of the transition to socialism and communism, "Labor is not the *source* of all wealth. *Nature* is just as much the source of use values (and it is surely of such that material wealth consists!) as labor, which itself is only the manifestation of a force of nature, human labor power" (p. 11). It is precisely capitalism's estrangement from wealth in this broader sense that constitutes its most fundamental contradiction (or the most general expression of the historically specific antagonism that arises under capitalism between use value and exchange value).

Capitalism's denial of nature's contribution to wealth in general, its treatment of everything outside itself as a "free natural power," (sometimes translated as "free gift of nature") is for Marx (1981) the ultimate manifestation of its blindness (p. 879). "What Lucretius says," he writes, "is self-evident: *nil posse creari de nihilo*, out of nothing, nothing can be created. Labor-power itself is, above all else, the material of nature transposed into a human organism" (Foster, 1994, pp. 118-124; Lucretius, 1951, p. 33; Marx, 1976, p. 323n). "Labor," Marx wrote at the beginning of *Capital* (1976), "is not the only source of material wealth, of use values provided by labor. As William Petty puts it, labor is its father, and the earth is its mother" (p. 134).

Failure to understand that for Marx, labor power was not the sole source of wealth, and that nature's contribution to wealth, in his view, had to be recognized by anyone who sought to step outside capitalism and examine it critically, has led to the charge that, in simply presenting the labor theory of value in his analysis of capitalism's laws of motion, Marx was somehow advocating ecological imperialism. Thus, Churchill (1996) writes that the labor theory of value

> carries with it several interesting sub-properties, most strikingly that the natural world holds no intrinsic of value of its own. A mountain is worth nothing as a mountain; it only accrues value by being 'developed' into its raw productive materials, such as ores and even gravel. . . . Similarly, a forest holds value only in the sense that it can be converted into a product known as lumber. . . . Again, other species hold value only in terms of their utility to productive processes . . . otherwise they may, indeed *must*, be preempted and supplanted by the most productive use of the habitat by humans. . . . All self-professing marxists, in order to be marxists at all must share in the fundamental premise involved. . . . To put a cap on this particular point, I would offer the observation that the labor theory of value is the underpinning of a perspective which is about as contrary to the indigenous worldview as it is possible to define. (pp. 467-468)

The problem with Churchill's (1996) analysis here is that in explaining that capitalist value relations take into account only labor values and treat nature as free gift, Marx was no more defending this condition of the system than he was defending capitalism itself. Although Marx is commonly viewed as simply an advocate of the labor theory of value—insofar as he believed like classical political economists generally that it was the basis of the law of value under capitalism—it is important to understand that he was just as much a critic of this state of things as he was of capitalism in general. Indeed, it is clear from his analysis that one of the major faults of capitalism from the standpoint of a higher form of society is precisely its narrow conception of wealth that excludes the contribution of nature, thus "ascribing *supernatural creative power* to labour" (Marx, 1971, p. 11); a fact that is closely related to capitalism's degrading of the natural bases of production (use value) in relation to its capitalist form (exchange value) (see Burkett, 1996, pp. 64-66; Foster, 1997a, pp. 157-158; Lebowitz, 1992, pp. 98-100).

For Marx, real wealth had to be viewed qualitatively in terms of use values and the rich interconnections between human beings and human beings and nature. Marx's ideal was of a world in which each human being would be creatively linked to the rest of humanity and nature; a world in which ordinary individuals would live a rich many-sided existence and would have a wealth of connections, not because they had much but because they were much (Foster, 1997b, p. 27; Fromm, 1965, p. ix). It is this noninstrumentalist, noneconomistic conception of wealth, standing in such stark opposition to what Ruskin (1967) termed *illth* (wealth as envisioned under capitalism) (p. 73), that constituted the essence of Marx's vision of communism—which, given past abuse of this term, might be better labeled *ecocommunism*.

It is clear, after reviewing Marx's consideration of the problem of the earth or soil, that his materialism led him beyond the realm of economics as it is usually understood to a deep-seated understanding of the central ecological crisis of capitalist agriculture and of capitalist production generally in the mid-nineteenth century. What emerged from this analysis was a concrete understanding (already prefigured in some ways in Marx's earliest writings) of ecological sustainability as a nature-imposed necessity on human production—albeit a necessity that was modified in various ways in different historical epochs depending on specific social-historical relations that developed.

Marx insisted that capitalism transgressed the boundaries of such sustainability, which was an everlasting condition in the chain of successive generations. Nevertheless, capitalism, he clearly believed, would fall due to its internal economic contradictions and the revolutionary role of the proletariat before such unsustainable development would emerge as a truly overriding factor of historical development. For this reason, most of Marx's concrete considerations of sustainability were geared to what the irrationality of capitalism's exploitation of the soil had to say about the necessary forms of production under communism. Here, production, in a society of associated producers, was explicitly tied by Marx to conditions of sustainability. Marx's analysis in this respect is diametrically opposed to the view—imposed on him in some environmentalist (even ecosocialist) interpretations of his work—that nature provides no limits to human production (see Benton, 1996; Walker, 1979).

In our time, the perpetuation and indeed universalization of capitalist relations of production has made the transgressing of such natural limits—the whole progression of a system of unsustainable development—the most critical issue of the age. "For today," as Mészáros (1995) has stated,

> It is impossible to think of anything at all concerning the elementary conditions of social metabolic reproduction which is not lethally threatened by the way in which capital relates to them—the only way in which it can. This is true not only of humanity's energy requirements, or of the management of the planet's mineral resources and chemical potentials, but of every facet of global agriculture, including the devastation caused by large scale de-forestation, and even the most irresponsible way of dealing with the element without which no human being can survive: water itself. (p. 174)

Today, the quest for human survival, and indeed for the survival of planetary life as we know it, demands more than ever that humanity achieve "a qualitative increase in conscious control over social developments, instead of leaving these to spontaneous, uncontrolled and ever more destructive processes" (Mandel, 1992, p. 243). Or as Marx (1981) put it, "Freedom, in this sphere [the realm of natural necessity], can consist only in this, that socialized man, the associated producers, govern the human metabolism with nature in a rational way, bring it under their collective control instead of being dominated by it as a blind power; accomplishing it with the least expenditure of energy and in conditions most worthy and appropriate for their human nature" (p. 959). Such a conscious, qualitative system of social control would have to reject the "sea of utilitarian brutality" (Morris, 1997, p. 21) that currently surrounds us and replace it with a more sustainable world community. The virtue of Marx's vision is that he allows us to understand that a world rooted in a communal ethic and in accord with the earth and its habitat is possible (its possibility residing in the very irrationality and unsustainability of the present social order) and that this alternative world can be a rich one of many-sided determination, characterized by ecological and cultural diversity—hence a world of more complete and universal human (and ecological) freedom.

As unlikely as such a social outcome may seem at present, it is not too late for humanity—in the form of a broad-based coalition for social and environmental justice rooted in the conditions of those most oppressed—to move decisively in this direction. "Wherever human beings are concerned," the great biologist Rene Dubos once said, "trend is not destiny" (Dubos quoted in McMichael, 1993, p. 13). As the ecological crisis matures along with the development of the capitalist world system, the choice of which path to take will more and more lie before us.

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