

MARX'S ECOLOGY IN THE 21st CENTURY

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Abstract: The most pressing problem confronting humanity in the 21st century is the ecological crisis. The "problem of nature" is really a problem of capital, as natural cycles are turned into broken linear processes geared to private accumulation. Important advances in ecosocialist theory illuminate the continuing importance of Marx's materialist and metabolic approach for studying the dialectical interchange between humans and nature and the creation of ecological rifts within ecosystems. Additionally, Marx's ecology serves as a foundation for understanding environmental degradation, given his critique of capital as a whole and his focus on the contradiction between use value and exchange value (which facilitates the expansion of private riches at the expense of public wealth, i.e., the Lauderdale Paradox). In stark contrast to the market mechanisms proposed to address the ecological crisis, which place profit above protecting nature, Marx's ecology stresses the necessity of establishing a social order that sustains the conditions of life for future generations.

Key words: Marx, ecology, ecological crisis, capitalism, metabolic rift, Lauderdale Paradox

To speak of "Marx's Ecology in the 21st Century" may sound strange to the contemporary ear. Marx wrote in the mid-19th century, while ecological thought is generally believed to have emerged in the late 20th century. Although it has been fairly widely recognized on the left in recent decades that Marx was an important precursor, indeed pioneer, of ecological critique, some have argued that these insights are, from today's standpoint, of mere historical value, to be relegated to the age of the steam engine.

Thus Marx's ecology in the eyes of some green left and even ecosocialist thinkers is largely irrelevant to 21st-century conditions. Maarten de Kadt and Salvatore Engel-Di Mauro have contended that "thinking about nature" "was then [in the time of Darwin and Marx] at a relatively early stage," with many advances in science still to be made. Marx was writing before nuclear power and before "the development

of the chemical sciences that produced PCBs, CFCs, and DDT.”¹ Therefore the direct contribution of his thought to the understanding of our current ecological problems is bound to be small.

Our argument is radically different. We contend that Marx's materialist and metabolic approach, his emphasis on the contradiction between use value and exchange value and between wealth and accumulation, his focus on sustainable human development, and his critique of capital as a whole, provide an invaluable methodological foundation to critique contemporary environmental degradation and to envision social and ecological transformation. To emphasize the importance of Marx's ecological dialectic is clearly not the same thing as saying that he specifically addressed all of the complex ecological problems that we now confront. Furthermore, we are not putting forth the absurd notion that “the original Marxian canon” is in itself “the true and sufficient guide to save nature from capitalism.”² Nevertheless, it is our contention that Marx's ecology provides us with a *critical method* (in the spirit of Lukács's claim that orthodoxy in Marxism relates chiefly to method) for engaging with the main limitation of contemporary ecological thought: its inability to develop a dialectical ecological materialism that relates the “problem of nature” back to the problem of society.

It is important to note that the initial attempts to formulate an ecosocialist perspective in our time suffered from failing to build on a historical understanding. The first stage of ecosocialist theory involved a smorgasbord approach, as a variety of theories were eclectically assembled and combined. Marxism was often grafted on green theory, or vice versa. Here, nature/environment was resurrected as an important consideration within Marxism, but ecosocialism stood on weak legs, as it accepted “various *ad hoc* formulae” and carefully avoided criticizing the “spiritualistic, idealistic, vitalistic and moralistic emphases” found in green theory. It also neglected to investigate the ecological insights and approaches of classical Marxism. Ironically, self-styled eco-Marxists often sought to subsume ecological contradictions under economic ones, suggesting that it was *economic* crisis arising from the undermining of the ecological *conditions of production* (James O'Connor's “second contradiction of capitalism”) that was the fundamental issue raised by *ecological* crisis, rather than the socially generated rift in the *conditions of life*—extending to nature itself.³

In order to transcend these shortcomings, the second stage of ecosocialist theory sought to return to the roots, going back to Marx, in order “to understand the ecological context of his materialism” and to determine the larger dimensions of his critique of political economy, which included how the capitalist system transformed the material conditions on which all life depends. This engagement demonstrated how Marx—influenced by the ancient Greek philosopher Epicurus—established a materialist conception of both nature and history, in which each was dialectically

bound to each other.⁴ It also connected Marx's value analysis (particularly his treatment of the contradiction between use value and exchange value) to his development of a concept of sustainable human development. Marx's ecological materialism is both a philosophical orientation and a critical standpoint from which to assess the internal contradictions of a particular mode of production: uncovering the emergent reality that is manifested from the dialectical interchange between society and nature. In this, human society is ecologically and historically embedded in the physical world.⁵ Marx's ecological method, which allows us more readily to perceive the contradictions between nature and society, thus remains invaluable in our time.

In what follows we will outline some of the main elements of Marx's dialectics of nature and society, by focusing on Marx's metabolic analysis, the relation of this to the Lauderdale Paradox, and how his notion of sustainability for successive generations plays into what could be called "the elementary triangle of ecology." In closing, we address some of the ways this impacts the ecological crisis discussions of the 21st century.

Marx and the Metabolic Rift

Marx was a materialist, whose main contribution, as he himself was wont to emphasize, lay in the development of the materialist conception of history. But for Marx the materialist conception of history was meant to complement dialectically the materialist conception of nature. Ultimately they were one. As Marx and Engels wrote in *The German Ideology*: "We know only one science, the science of history. History can be viewed from two sides: it can be divided into the history of nature and that of man. The two sides, however, are not to be seen as independent entities. As long as man has existed, nature and man have affected each other."⁶ It is in this sense that one can speak of Marx's historical materialism as also embodying an ecological materialism.

As part of his commitment to ecological materialism, Marx recognized that natural systems, such as the nutrient cycle, had a particular metabolism (an exchange of matter and energy), which operated independently of and in relation to human society, allowing for their regeneration and/or continuance. Thus, there are particular regulatory processes that govern the interchange of materials. Marx extended this concept of metabolism to social interactions with nature, explaining that there is a necessary "metabolic interaction" between humans and the earth. Natural processes—such as the soil nutrient cycle, carbon cycle, trees producing fruit—help support human survival. Thus, "the earth itself is a universal instrument... for it provides the worker with the ground beneath his feet and a 'field of employment'

for his own particular process.”⁷ It provides “the *natural* conditions of labour, such as fertility of soil, mines, and so forth.”⁸

Marx explained that labor is part of the metabolic interchange through which humans actively transform the earth. He wrote:

Labour is, first of all, a process between man and nature, a process by which man, through his own actions, mediates, regulates and controls the metabolism between himself and nature. He confronts the materials of nature as a force of nature. He sets in motion the natural forces which belong to his own body, his arms, legs, head and hands, in order to appropriate the materials of nature in a form adapted to his own needs. Through this movement he acts upon external nature and changes it, and in this way he simultaneously changes his own nature.⁹

He highlighted how human beings are dependent upon nature and forge their history in relation to it. At the same time, he employed the concept of social metabolism to refer to the “dynamic interchange between human beings and nature” of matter and energy. In this, he pointed out that there are “nature-imposed conditions” that allowed for the regeneration of natural systems; but also that human beings had the capacity to affect these processes, given the particular forms of social interaction that were imposed. The whole analysis of metabolism was conceptually integrated in Marx and Engels’s work with the development of thermodynamics within 19th-century physics.¹⁰

After ecologically embedding society, Marx historically situates the particular social metabolism of the capitalist mode of production, which influences the material interchange between society and nature. Here his critique of political economy is wedded to his metabolic analysis. Capitalism is a system predicated on the constant accumulation of capital. It is both “the subjective goal and the motor force of the entire economic system.”¹¹ As a result, it is propelled by endless growth, on a continuously larger scale on the treadmill of accumulation, as “money capital is transformed into a commodity (via production), which then has to be sold for more money, realizing the original value plus an added or surplus value.”¹² This “insatiable appetite” to expand and to accumulate is reinforced by competition and the concentration and centralization of capital. This growth requires raw materials and energy, given that nature is used to fuel industry and to produce the commodities for market. This inherent impulse toward exponential growth intensifies the social metabolism of the capitalist order, increasing the demands placed on nature. New technologies are employed to expand production and to reduce labor costs. As a result, capitalism and nature are caught in an “enduring conflict.”¹³ The increasing scale of production generates widespread ecological degradation and pollution in a finite world, and the systematic exploitation of nature threatens to undermine the natural cycles and processes that aid in the regeneration of ecosystems.

The social metabolism of capitalism is increasingly separated from the natural metabolism, producing metabolic rifts in natural cycles and processes. Such metabolic rifts violate the nature-imposed regulative laws of social production, which require that the vital conditions of nature's reproduction be sustained, creating the danger of a downward spiral of ecological degradation. Marx developed this metabolic analysis in the historically specific context of the emerging soil crisis in England in the 19th century. He noted that the soil required specific nutrients—nitrogen, phosphorus, and potassium—to maintain its ability to produce crops, because as crops grew they took up these nutrients. But the division between town and country due to the enclosure movement increasingly collected the population in urban areas. As a result, food and fiber were shipped from the countryside to distant markets, transferring soil nutrients to cities where they accumulated as waste, rather than being returned to the soil. Marx explained that this type of production “disturbs the metabolic interaction between man and the earth, i.e. it prevents the return to the soil of its constituent elements consumed by man in the form of food and clothing; hence it hinders the operation of the eternal natural condition for the lasting fertility of the soil.”¹⁴ As a consequence, a metabolic rift is created in the nutrient cycle.

The transfer of nutrients was tied to the accumulation process and increasingly took place at the national and international level. Nutrients were not recycled back to the land. Influenced by the treadmill of accumulation, intensive agricultural practices—which eventually included the mass importation of bones and guano, as well as the use of artificial fertilizers—were implemented to sustain and to increase the yield of food and fiber to be sold in markets in the cities. These practices, however, did not mend the metabolic rift. The riches of the soil continued to be squandered and the soil was persistently depleted of its necessary nutrients.

The social metabolic order of capitalism is inseparable from ecological imperialism and the expansion of the economic system. Intensive agricultural production in England in the 19th century contributed to a global metabolic rift, as millions of tons of guano and nitrates from Peru and Chile were transferred to the North to enrich exhausted soils. This international trade involved asymmetries in the exploitation of nature as well as labor. Over 90,000 Chinese were transported, often under force, to Peru to work on plantations and railroads. Marx characterized the Chinese coolie labor system that was created as “worse than slave labor.” The worst conditions were found on the guano islands where Chinese laborers were forced to dig through layers of guano, filling sacks and barrows that were then loaded on ships. These workers were not allowed to leave the islands, were physically beaten for infractions, and were malnourished. They spent their days being treated as expendable beasts, choking on the thick dust of guano. The fertilizer that enriched the soils of the North

was intimately tied to the exploitation and shortened lives of Chinese workers, the debt-burden of Peru, and the exhaustion of a natural resource.¹⁵

Marx's metabolic analysis points to the fact that, rather than abiding to sustainability needs of natural systems, capital attempts to bridge whatever rifts it creates through technological fixes—such as the use of artificial fertilizers to maintain production in the face of the systematic depletion of soil nutrients—without properly addressing the social causes of the metabolic rift. Such artificial solutions simply shift the problem elsewhere, creating additional environmental concerns and compounding the overall problem. Even today, the extensive application of artificial fertilizers has caused runoff, polluting waterways and overloading marine ecosystems with nutrients. Extensive “dead zones” in coastal waters have been created.¹⁶ In this situation, agricultural production can have ecological consequences that ripple far beyond the immediate context and cause degradation in systems that are not directly associated with food production. The metabolic approach helps capture these relationships since it focuses on the ecological context itself and is not simply concerned with environmental throughputs in the realm of production.

The power of Marx's ecology is that it provides a rigorous approach for studying the interchange between society and nature, while taking into consideration the specific ecological conditions of an ecosystem (and the larger web of nature), as well as the particular social interactions as shaped by the capitalist mode of production. Here various environmental problems can be historically and ecologically embedded through an ecological materialist approach that employs a metabolic analysis. The utility of this position is being shown in recent studies that extend the metabolic analysis to contemporary ecological problems.

Capitalist growth has become increasingly reliant on the burning of fossil fuels to power the machinery of production and to support the unequal exchange of trade between nations. This economic expansion involved breaking the solar-income budget by mining the earth for stored energy, which has introduced massive quantities of carbon dioxide into the atmosphere. At the same time, the absorption capacity of carbon sinks is being diminished due to deforestation. As a result, the carbon metabolism of capitalism is driving global climate change, pushing humanity toward a tipping point that would fundamentally change ecological conditions.¹⁷

Marx's metabolic analysis has also been extended to the marine environment, where humans have transformed the ocean ecosystem through overfishing, causing a collapse in fisheries, which undermines the ability of fish to replenish their populations. The delicate web that runs throughout aquatic systems and food chains is threatened under a system that knows no limits. While Marx examined the soil crisis in the 19th century, Philip Mancus indicates how soil problems persist, given the constant depletion of nutrients. As a result, capitalist agribusiness relies on a fertilizer treadmill in order to produce food on marginal and depleted land at the rate

and on the scale demanded by the system.¹⁸ These metabolic analyses illuminate social-natural dislocations associated with capitalist growth, as metabolic rifts are created in ecosystem after ecosystem, multiplying in intensity and scale as the social metabolism of the system is pushed onwards overwhelming nature on every front.

This ecological materialist-metabolic analysis reveals the inherently unsustainable character of the capitalist system, as the world is reduced to the logic of capital and every realm of the world serves as a means to further the accumulation process. Marx clearly characterized capital's insatiable appetite, noting:

Capital creates the bourgeois society, and the universal appropriation of nature.... For the first time, nature becomes purely an object for humankind, purely a matter of utility; ceases to be recognized as a power for itself; and the theoretical discovery of its autonomous laws appears merely as a ruse so as to subjugate it under human needs, whether as an object of consumption or as a means of production. In accord with this tendency, capital drives beyond national barriers.... It is destructive towards all of this, and constantly revolutionizes it, tearing down all the barriers which hem in the development of the forces of production, the expansion of needs, the all-sided development of production, and the exploitation and exchange of natural and mental forces.¹⁹

Marx proposed that a new social metabolic order was necessary to counter the destructive tendencies of capitalism, which include the creation of metabolic rifts and ecological degradation in general. He envisioned a system of associated producers engaged in metabolic restoration and abiding by the laws of social and natural reproduction, thereby ensuring that the social interchange with nature did not undermine the conditions of life.²⁰

Marx and the Lauderdale Paradox²¹

Much of Marx's work was of course occupied with the critique of political economy, and it is frequently charged that his emphasis on the labor theory of value put him in direct opposition to the kind of ecologically informed value analysis, taking into account nature itself, that is needed today. Luiz Barbosa contends that Marx "believed raw materials are given to us gratis (for free) by nature and that it is human labor that gives it value. Thus, Marx failed to notice the intrinsic value of nature."²² Likewise Jean-Paul Deléage has complained that in making labor the only source of value Marx "attributes no intrinsic value to natural resources."²³ Writing from a more philosophical standpoint, Joel Kovel argues that Marx, while rooting use value in nature, saw little "need to differentiate use-value from any notion of intrinsic value in nature," i.e., nature "for itself." Hence, Marx can be criticized for "a foreshortening of the intrinsic value of nature."²⁴

Such views, characteristic of first stage ecosocialism (and mainstream green analysis), criticize Marx for adopting non-ecological approaches to nature's value, while at the same time failing to trace his actual views to their historical roots. In contrast, a close scrutiny of Marx's analysis of value/wealth and its relation to ecology brings out not its weaknesses but rather its strengths in ecological terms.

Most criticisms of Marx's value analysis as anti-ecological are based on a failure to understand Marx's analysis as a *critique* of political economics, i.e., of the dominant class analytics of capitalist society. The conceptual categories that Marx uses in his critique, such as nature as a free gift, and the law of value, are categories that he did not invent, but ones that he took over from classical political economy—recognizing that they exhibited the real tendencies of the system—and that he sought to transcend by transcending bourgeois society itself. In this sense, Marx is a scientist seeking to trace the capitalist virus, all the time searching for a cure.

The idea that nature was a “free gift” was basic to classical liberal economics and was advanced by Malthus long before Marx.²⁵ It reflected quite accurately the bourgeois relation to nature. Although accepting it as a reality of capitalist political economy, Marx was nevertheless aware of the social and ecological contradictions embedded in such a view. Thus in his *Economic Manuscripts of 1861–63* he repeatedly attacked Malthus for falling back on this “physiocratic notion” of the environment as “a gift of nature to man,” while failing to recognize that this was in fact the product of historically specific social relations brought into being by capital.²⁶ For Marx, with his emphasis on sustainable development, such views conveyed the contradiction between nature and a system of accumulation that systematically “robbed” it. Such a relation was built into the “law of value” of capitalism, but it was not to be regarded in any sense as a general law for all historical formations.

Still, since the treatment of nature as a “free gift” was basic to the capitalist economy, it continued to be included as a basic proposition underlying neoclassical economics. It was repeated as a basic axiom in the work of the great neoclassical economist Alfred Marshall, and has continued to be advanced in orthodox economic textbooks. Campbell McConnell states in a widely used economics textbook that “land refers to all natural resources—all ‘free gifts of nature’—which are useable in the production process.” Furthermore, “land has no production costs; it is a ‘free and nonreproducible gift of nature.’” In their *Introduction to Environmental Economics*, Nick Hanley, Jason F. Shogren, and Ben White state that “natural capital comprises *all [free] gifts of nature*, and so includes renewable and non-renewable energy and material resources; clean air and water; nutrient and carbon cycles; and biodiversity” (italics added).²⁷

It might appear that criticisms of Marx based specifically on the labor theory of value would be particularly damning, since it suggests that only labor generates value. Yet, here too close inspection reveals quite the opposite. The labor theory

of value of course was not confined to Marx but had a distinguished history as the basis of classical economics. Moreover, the seeming anti-ecological nature of the labor-theoretic approach to value involves confusions between the words *value* and *wealth*. From the beginning wealth was associated with what was called by Locke “intrinsic value” and was referred to by later political economists as “use value.”²⁸ This was seen as natural and qualitative in character, and having nothing to do with the socioeconomic creation of “exchange value,” i.e., quantitative value (or simply value for short), which was a product of the expenditure of human labor in production. From the standpoint of classical economics, including Marx, it is therefore possible to increase value (in the sense of exchange value) while decreasing wealth (related to use value or intrinsic value). If human labor was one source of wealth, which became the basis of value under capitalism, nature was another source of wealth. Those who saw labor as the sole source of wealth were, according to Marx, attributing “supernatural creative power” to labor. Instead, he quoted William Petty, who had said: “labour is the father of material wealth, the earth is its mother.”²⁹ Capitalism’s failure to incorporate nature into value accounting and its tendency to confuse value with wealth were, for Marx, fundamental contradictions of the system, reflecting the dominance of exchange value over use value, and the robbing of nature for the sake of accumulation. Thus “those who fault Marx for not ascribing value to nature,” Paul Burkett has written, “should redirect their criticisms to capitalism itself.”³⁰

The ecological contradictions in which capitalist society was led—through its emphasis on the valorization of capital (the promotion of exchange value) at the expense of the sustainability of nature (use value/intrinsic value)—can be seen most concretely in what is known as the “Lauderdale Paradox.” James Maitland, the eighth Earl of Lauderdale (1759–1839), was the author of *An Inquiry into the Nature and Origins of Public Wealth and into the Means and Causes of its Increase* (1804). Lauderdale, in the paradox with which he is now associated, argued that there was a contradiction between public wealth and private riches such that an increase in the latter normally diminished the former. “Public wealth,” he wrote, “may be accurately defined,—to consist of all that man desires, as useful or delightful to him.” Such goods have use value and thus constitute wealth. But value (or exchange value) as opposed to wealth required something additional, consisting “of all that man desires as useful or delightful to him; which exists in a degree of scarcity.” This led Lauderdale to argue that if one creates scarcity in such abundant but necessary elements of life as water, air, and food one could enhance private riches and indeed the riches of the country but only at the expense of public wealth. For example, if one could monopolize water that had previously been freely available, placing a fee on wells, one would expand the riches of the country to the extent that the access

to abundant water resources (i.e., public wealth) was reduced and individuals were increasingly thirsty.

Lauderdale explained how when there was a particularly fertile period Dutch colonialists burned “spiceries” or paid natives to pick the young blossoms or green leaves from the nutmeg trees to kill them off; how the planters in Virginia were at times required to burn a certain amount of tobacco for every slave working their fields. These actions were designed to increase scarcity and to enhance private riches by destroying what constituted public wealth—in this particular case, the produce of the earth. “So truly is this principle understood by those whose interest leads them to take advantage of it,” Lauderdale wrote, “that nothing but the impossibility of general combination protects the public wealth against the rapacity of private avarice.”³¹

For Marx, Lauderdale’s argument was the chief example of the recognition among the classical economists of the contradiction between use value and exchange value. Lauderdale, he claimed, had “founded his system on the inverse ratio of the two kinds of value.” This insight was to have a considerable effect on classical economists. Marx quoted Ricardo as insisting that Lauderdale’s paradox indicated the importance of keeping value (exchange value) and wealth (use value) conceptually distinct.³² Marx himself was to build his critique of political economy in large part around the contradiction between use value and exchange value. In his analysis of the metabolic rift Marx wrote consistently of the robbing of the soil by industrial agriculture, and thus of the robbing of nature and public wealth due to value expansion and accumulation under capitalism.

In order for a natural resource to become a source of exchange value, Marx argued, all that was essential was that it be monopolized and alienated. Yet, under capitalism, monopolization of natural resources frequently gave rise to destruction of public wealth in the process of expanding private riches.³³ The accumulation of capital for the benefit of a few thus often went hand in hand with decreases in the wealth of society as a whole. In this way accumulation of capital, which was important in building up the productive forces of society in Marx’s conception, was so destructive in its creativity that it needed to be dispensed with once its historic task had been completed—simply in order to protect life itself.

Marx’s analysis of the destruction of the wealth of nature for the sake of accumulation is most evident in his rent theory, which deals with the consequences of the monopolization of land/nature for private gain. It is here that the analysis of the metabolic rift, and of the ecologically destructive nature of the valorization of capital (which treats nature as a free gift)—generating the Lauderdale Paradox—are brought together. It is here therefore that Marx frequently refers to the conditions of sustainability: the need to protect the earth for successive generations. A condition of this, as stipulated by Marx, is that no one (not even an entire society or all societies put together) owns the earth, which must be preserved for future generations on the

principles of good household management. For this to be possible the metabolic relation between human beings and nature needs to be rationally regulated by the associated producers in line with their needs and those of future generations, conserving at the same time the energy involved in such processes.³⁴ For Marx, sustaining nature was usually looked at from an exclusively human perspective in terms of sustaining use values. But he also referred at times to nature's right to not be reduced to a commodity at all. Thus he quoted Thomas Müntzer's famous statement objecting to the fact that in the developing bourgeois society "all creatures have been made into property, the fish in the water, the birds in the air, the plants on the earth—all living things must also become free."³⁵

On the above basis we can speak of an "elementary triangle of ecology" emerging from Marx's thought (related to Chávez's "elementary triangle of socialism"—also derived from Marx): (1) social use, not ownership, of nature; (2) rational regulation by the associated producers of the metabolism between human beings and nature; and (3) the satisfaction of communal needs—not only of present but also future generations.³⁶

Capitalism and the Ecological Crisis in the 21st Century

What significance does Marx's ecology have for the global ecological crisis now threatening the entire earth? We are facing a world in which every ecosystem on earth is in decline, half of the species in existence may be driven into extinction this century, and carbon emissions are increasing at ten times the rate of the previous decade, driving the world down a road of accelerating climate change.³⁷ Is it conceivable that Marx's ecology, developed in the 19th century, would have lessons to teach us now?

We argue that Marx's ecology has methodological import today, precisely because it represents the transcendence of capitalist practice. Here we can turn to Marx's analysis of the metabolic rift, and his understanding of the wealth-value (use value–exchange value) contradiction and its relation to ecological conditions, in line with the Lauderdale Paradox. Capital accumulation requires the continual expansion of the division of nature as well as the division of labor. The division of nature is no longer, however, a social division of nature, in which the earth's different landscapes and species are utilized by human beings within a context that maintains the reproduction of nature itself. Instead, it is a detailed/alienated division of nature that breaks the circle of natural processes, creating ecological rifts. Nature is remade in such a way as to promote a single end: the accumulation of capital, irrespective of the lessons of rational science and conditions of sustainability. Thus, it has now been conclusively demonstrated that in terms of food production per acre and nutrient provision, a system based on small farms and/or cooperative agriculture is almost

invariably superior.³⁸ Yet, large-scale, monopolistic agribusiness is everywhere taking over, since it is successful at promoting private riches—even at the expense of public wealth. The result is an expanding metabolic rift.

Today, for instance, phosphorus—deposits of which are mined for fertilizer (with China as the world's number one “producer”)—has been described by *Scientific American* as “a ticking time bomb,” as supplies are rapidly diminishing and becoming more concentrated in just a few areas. At the same time excessive use of phosphorus by modern agribusiness to compensate for the robbing of the soil of this nutrient has resulted in toxic conditions throughout the planet, helping to generate dead zones in coastal areas as a result of fertilizer runoff. More than 400 such dead zones now exist worldwide.³⁹ These developments not only point to the metabolic rift that capitalist production inevitably generates, but also the rapid decrease in public wealth as a result of the pursuit of private riches.

In mainstream economics the favorite response to the current environmental problem is to find ways to price nature, to turn natural resources into natural capital, and to turn the climate into a market (via emissions trading). The assumption is that private accumulation is efficient (in some absolute sense) and that the increased efficiency arising from the extension of markets to unpriced or underpriced nature will be enough to solve the environmental problem.⁴⁰ More often than not, however, such views fail to distinguish between exchange value and use value, between value and wealth. Hence, they focus simply on whether national income can continue to rise without looking at the wider effects.

For example Robert Solow, a winner of the Bank of Sweden's Nobel Memorial Prize in Economic Sciences, has argued that as resources become more scarce, prices of those resources will go up, efficiency in their use will rise, and substitutes will be found. Hence, the market offers automatic solutions to ecological problems and the “limits to growth.” However, Solow's argument is so couched in exchange-value terms that he fails to notice that with rising prices exploitation of resources may increase faster than overall efficiency, and hence exhaustion will speed up. His emphasis on substitutes tends to downplay the importance of given natural resources and to disguise the fact that these substitutes (which themselves cannot be treated as free gifts of nature) may also be exploited much faster. In other words, the whole argument fails to appreciate that natural wealth is being depleted, and, what is worse, torn apart, with serious long-term consequences for the earth and its inhabitants.⁴¹ Although Solow's argument downplays the role of natural resources, Engels, who understood like Marx that accumulation could undermine natural wealth, complained in a letter to the latter of the “squandering [of] our reserves of energy, our coal, ore, forests, etc.”⁴²

Ecological economist Herman Daly has argued in an article entitled “The Return of Lauderdale's Paradox” that the ecological contradiction has become much more

serious today. As the world “gets crowded due to population growth and economic growth,” he writes, “previously free goods become scarce and get a price greater than zero. We therefore observe an increase in private riches and perversely celebrate, while not noticing the decline in public wealth. Lauderdale’s paradox seems to be the price we pay for measuring wealth in terms of exchange value.”⁴³ Lauderdale in the 19th century pointed to water as a potential scarce resource, which if in short supply and monopolized, could lead to the enhancement of private riches disguising a dangerous destruction of public wealth. Today fresh water is increasingly scarce, and as a “solution” the system is pushing its privatization, which will once again enhance private riches, but only by further compounding the problem of ecological scarcity.⁴⁴

All of this leads to other critical ecological questions: What happens when tradable markets in carbon emissions are established, allowing capital to accumulate on the basis of carbon trading? Will this protect the most important form of public wealth of all (the climate) or will it end up diminishing (or at least not preserving) that public wealth, while expanding private riches? Will such an attempt to create a market in carbon at best simply shift the problem around, while the global metabolic rift expands? What are the dangers that this will simply give further rein to the Lauderdale paradox of such concern to Marx?

In our view, the essential problem can be traced to the fact, as Barry Commoner pointed out long ago, that the circles that constitute natural cycles are being turned into broken linear processes geared to private accumulation. The nature of accumulation is such that this is occurring on an ever-progressing scale, putting unbearable burdens on increasingly vulnerable ecosystems.⁴⁵ The global metabolic rift that this generates cannot help but expand under the capital system. It follows that the healing of the earth can only occur through the restoration of the elementary triangle of ecology under an egalitarian and sustainable socialist society. As Isaac Deutscher observed in his *Unfinished Revolution*: “Humanity needs unity [we might add, with the earth as well] for its sheer survival; where can it find it if not in socialism?”⁴⁶

Notes

1. Maarten de Kadt and Salvatore Engel-Di Mauro, “Failed Promise,” *Capitalism, Nature, Socialism* 12 (2001): 50–54.
2. Joel Kovel, *The Enemy of Nature* (New York: Zed Books, 2002), pp. 210–211. Kovel leveled this criticism specifically at the work of one of the present authors and Paul Burkett. With respect to the latter, it should be noted that Burkett’s very complex, dialectical treatments of Marx’s ecology in relation to current theoretical debates in ecological economics, and the way in which he is able to generate a new *synthesis* that is *rooted* in Marx’s approach, while also incorporating elements of other traditions and contemporary developments, clearly vindicates him of Kovel’s false accusation, that he sees Marx as not only *necessary* but also *sufficient* for the understanding

- of today's ecological problem. See Paul Burkett, *Marx and Nature* (New York: St. Martin's Press, 1999) and *Marxism and Ecological Economics* (Boston: Brill, 2006).
3. John Bellamy Foster, "Review of *Environmental Politics*," *Historical Materialism* 8 (2001): 461–477; Paul Burkett, "Two Stages of Ecosocialism?," *International Journal of Political Economy* 35, 3 (2006): 23–45.
 4. John Bellamy Foster, *Marx's Ecology* (New York: Monthly Review Press, 2000).
 5. Brett Clark and Richard York, "Dialectical Materialism and Nature," *Organization & Environment* 18 (2005): 318–337; Richard York and Philip Mancus, "Critical Human Ecology," *Sociological Theory* 27 (2009): 122–149; John Bellamy Foster, "The Dialectics of Nature and Marxist Ecology," in Bertell Ollman and Tony Smith, eds., *Dialectics for the New Century* (New York: Palgrave, 2009).
 6. Karl Marx and Frederick Engels, excerpt from *The German Ideology*, in Karl Marx, *Writings of the Young Marx on Philosophy and Society* (Indianapolis: Hackett, 1967), p. 408. This is a crossed-out passage in the manuscript, not included in the *Collected Works* edition.
 7. Karl Marx, *Capital*, vol. 1 (New York: Vintage, 1976), pp. 286–287, 637–638.
 8. Karl Marx, *Theories of Surplus Value*, vol. 3 (Moscow: Progress Publishers, 1971), p. 34.
 9. Marx, *Capital*, vol. 1, p. 283.
 10. Foster, *Marx's Ecology*, p. 158; Paul Burkett and John Bellamy Foster, "Metabolism, Energy, and Entropy in Marx's Critique of Political Economy," *Theory and Society* 35 (2006): 109–156.
 11. Paul Sweezy, "Capitalism and the Environment," *Monthly Review* 41, 2 (1989): 1–10.
 12. John Bellamy Foster, "The Treadmill of Accumulation," *Organization & Environment* 18, 1 (2005): 14.
 13. Allan Schnaiberg and Kenneth A. Gould, *Environment and Society* (New York: St. Martin's Press, 1994); Richard York, Brett Clark, and John Bellamy Foster, "Capitalism in Wonderland," *Monthly Review* 61, 1 (2009): 1–18.
 14. Marx, *Capital*, vol. 1, p. 637.
 15. Brett Clark and John Bellamy Foster, "Ecological Imperialism and the Global Metabolic Rift," *International Journal of Comparative Sociology* 50 (2009): 311–334; Karl Marx and Frederick Engels, *On Colonialism* (New York: International Publishers, 1972).
 16. Brett Clark and Richard York, "Rifts and Shifts," *Monthly Review* 60, 6 (2008): 13–24.
 17. Brett Clark and Richard York, "Carbon Metabolism," *Theory and Society* 34, 4 (2005): 391–428; Herman Daly, *Steady-State Economics* (San Francisco: W. H. Freeman and Company, 1977).
 18. Rebecca Clausen and Brett Clark, "The Metabolic Rift and Marine Ecology," *Organization & Environment* 18, 4 (2005): 422–444; Philip Mancus, "Nitrogen Fertilizer Dependency and Its Contradictions," *Rural Sociology* 272, 2 (2007): 269–288. Also see John Bellamy Foster and Fred Magdoff, "Liebig, Marx, and the Depletion of Soil Fertility: Relevance for Today's Agriculture," in Fred Magdoff, John Bellamy Foster, and Frederick H. Buttel, eds., *Hungry for Profit: The Agribusiness Threat to Farmers, Food, and the Environment* (New York: Monthly Review Press, 2000), pp. 23–41.
 19. Karl Marx, *Grundrisse* (New York: Penguin Books, 1993), pp. 409–410.
 20. John Bellamy Foster, *The Ecological Revolution* (New York: Monthly Review Press, 2009), pp. 50–53.
 21. The argument in this section is a shortened version of a critique developed in John Bellamy Foster and Brett Clark, "The Paradox of Wealth: Capitalism and Ecological Destruction," *Monthly Review* 61, 6 (2009): 1–18.
 22. Luiz C. Barbosa, "Theories in Environmental Sociology," in Kenneth A. Gould and Tammy Lewis, eds., *Twenty Lessons in Environmental Sociology* (New York: Oxford University Press, 2009), p. 28.
 23. Jean-Paul Deléage, "Eco-Marxist Critique of Political Economy," in Martin O'Connor, ed., *Is Capitalism Sustainable?* (New York: Guilford, 1994), p. 48.
 24. Kovel, *The Enemy of Nature*, pp. 211, 221.
 25. Thomas Malthus, *Pamphlets* (New York: Augustus M. Kelley, 1970), p. 185.
 26. Marx and Engels, *Collected Works*, vol. 34, pp. 151–159.

27. Campbell McConnell, *Economics* (New York: McGraw Hill, 1987), pp. 20, 672; Nick Hanley, Jason F. Shogren, and Ben White, *Introduction to Environmental Economics* (New York: Oxford University Press, 2001), p. 135. Alfred Marshall, *Principles of Economics* (London: Macmillan, 1920).
28. Robert Brown, *The Nature of Social Laws* (Cambridge: Cambridge University Press, 1984), pp. 63–64.
29. Karl Marx, *Critique of the Gotha Programme* (New York: International Publishers, 1938), p. 3; Marx, *Capital*, vol. 1, p. 134.
30. Burkett, *Marx and Nature*, p. 99.
31. James Maitland, Earl of Lauderdale, *An Inquiry into the Nature and Origin of Public Wealth and into the Means and Causes of its Increase* (Edinburgh: Archibald Constable and Co., 1819), pp. 37–59. Lauderdale was closest to Malthus in classical political economy, but generally rejected classical value theory, emphasizing the laws of supply and demand and the three factors of production (land, labor, and capital) as if this was sufficient. Marx, who took Ricardo as his measure of bourgeois political economy, therefore had little genuine interest in Lauderdale as a theorist, apart from the latter's sense of the contradiction between use value and exchange value as reflected in his famous paradox.
32. Karl Marx, *The Poverty of Philosophy* (New York: International Publishers, 1964), pp. 35–36.
33. Marx, *The Poverty of Philosophy*, pp. 48–49; Burkett, *Marx and Nature*, p. 94.
34. Karl Marx, *Capital*, vol. 3 (New York: Penguin Books, 1991), pp. 911, 959.
35. Karl Marx, *Early Writings* (New York: Vintage, 1974), p. 239; Thomas Müntzer, *Collected Workers* (Edinburgh: T. & T. Clark, 1988), p. 335. See also Frederick Engels, *The Peasant War in Germany* (New York: International Publishers, 1926), p. 68.
36. Paul Burkett, "Marx's Vision of Sustainable Human Development," *Monthly Review* 57, 5 (2005): 34–62. Marx, *Capital*, vol. 3, p. 911.
37. Elizabeth Kolbert, "The Sixth Extinction," *The New Yorker*, May 25, 2009; Eli Kintisch, "Projections of Climate Change Go from Bad to Worse," *Science* 323 (2009): 1546–1547; John Bellamy Foster, Brett Clark, and Richard York, "The Midas Effect: A Critique of Climate Change Economics," *Development and Change* 40, 6 (2009): 1085–1097.
38. Peter Rosset, "Fixing Our Global Food System," *Monthly Review* 61, 1 (July–August 2009).
39. David A. Vaccari, "Phosphorus: A Looming Crisis," *Scientific American* (June 2009): 54–59.
40. Peter H. May and Ronaldo Serôa da Motta, *Pricing the Planet* (New York: Columbia University Press, 1996); Paul Hawken, Amory Lovins, and L. Hunter Lovins, *Natural Capitalism* (Boston: Little, Brown and Co., 1999).
41. Robert Solow, "Is the End of the World at Hand?," in Andrew Weintraub, Eli Schwartz, and J. Richard Aronson, eds., *The Economic Growth Controversy* (White Plains, New York: International Arts and Sciences Press, 1973), pp. 39–61; Burkett, *Marx and Nature*, pp. 97–98.
42. Marx and Engels, *Collected Works*, vol. 46, p. 411.
43. Herman Daly, "The Return of Lauderdale's Paradox," *Ecological Economics* 25 (1988): 21–23. See also Herman Daly and John Cobb, *For the Common Good* (Boston: Beacon Press, 1994), pp. 147–148.
44. Maude Barlow, *Blue Covenant* (New York: New Press, 2007).
45. Barry Commoner, *The Closing Circle* (New York: Alfred A. Knopf, 1971).
46. Isaac Deutscher, *The Unfinished Revolution* (Oxford: Oxford University Press, 1967), pp. 110–114.