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Marxian Ecology, Dialectics, and the Hierarchy of Needs

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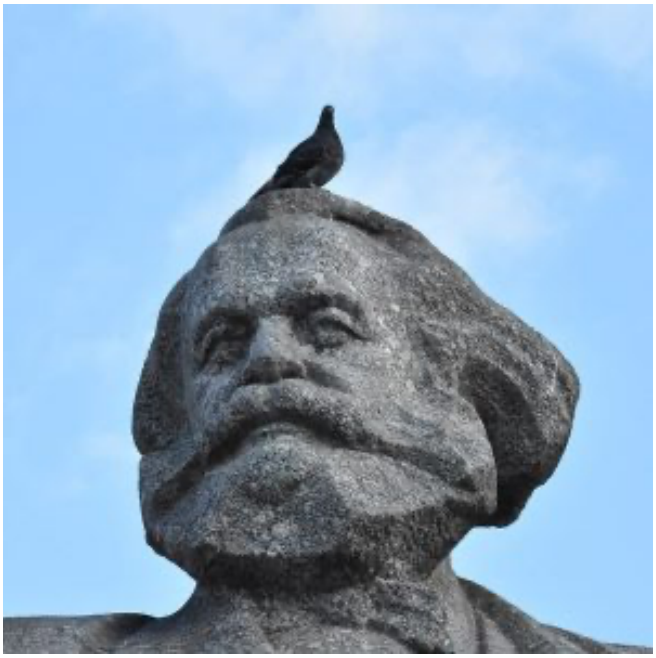
Dan Swain and Monika Woźniak: More than two decades ago, you refuted popular assumptions about Karl Marx's relation to ecological issues in your book Marx's Ecology. In your recent book, The Return of Nature, you undertake a similar task in regard to the other founding figure of Marxism, Frederick Engels. Why do you see it as so important to set the record straight when it comes to the popular views of Engels?



Karl Marx statue in Moscow (August 20, 2019). By Yerevantsi - Own work, CC BY-SA 4.0, Link

John Bellamy Foster: In Marx's Ecology and The Return of Nature, I was not primarily concerned with refuting "popular assumptions" on Marx and Engels's ecology which were, of course, mainly products of a profound lack of knowledge of their thought in this area. As Baruch Spinoza said, "Ignorance is no argument." It thus hardly deserves a direct refutation. Rather, the concern was the more affirmative one of unearthing the classical historical-materialist ecological critiques developed by Marx and Engels, as well as later socialist thinkers who were influenced by them, as a methodological basis on which to develop a socialist ecology for the twenty-first century.

Marx, as we know today, was a foundational ecological thinker, not only in relation to his own time but also with respect to our own, since crucial aspects of his method have never been surpassed. This acute understanding of ecological contradictions grew out of his fundamental materialist method and was evident in his concepts of the

"universal metabolism of nature," the "social metabolism," and the "irreparable rift in the interdependent process of social metabolism" (or metabolic rift). This allowed him, in a way that is unique in ecological thought down to the present, to develop a critique of the political economy of capital that focused on both the social and the environmental contradictions of the mode of production. His analysis in this respect anticipated and, in some ways, influenced the subsequent development of ecological thought. Today, the recovery of his ecological method has attained a real importance with regard to both theory and practice, giving rise to a powerful critique of the planetary crisis of the twenty-first century, underpinning the modern ecosocialist movement.

Engels adopted the same fundamental materialist method (if less philosophically sophisticated) as Marx, but their analyses took on somewhat different emphases rooted in the division of labor they adopted in their work. Although Marx was thoroughly immersed in the natural science of his time, and brought this into Capital at numerous points, it was Engels who more directly addressed natural science in his Condition of the Working Class in England (which was a pioneering work in epidemiology) and later in his Dialectics of Nature and Anti-Dühring. Engels's materialism, together with his approach to the dialectics of nature, propelled his work in an ecological direction. He famously said that "Nature is the proof of dialectics." Although this has often been criticised, what he clearly meant, in today's terms, was that "Ecology is the proof of dialectics," a view that takes on new meaning in the twenty-first century. In "The Part Played by Labour in the Transition from Ape to Man" (included in the Dialectics of Nature), Engels provided not only what Stephen Jay Gould called the most developed conception of gene-culture evolution, and thus the most advanced understanding of human evolution, to appear in the nineteenth century, he also provided one of the most powerful critiques of ecological destruction to be developed in his time and indeed up to our own.

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Engels's incorporation of Darwin's evolutionary theory within Marxist analysis was to influence subsequent socialist analyses. His theory of dialectics as constituting what we now call the "emergence" of new material powers through changing forms of organisation, or what Joseph Needham called "integrative levels," was crucial to later work by socialist scientists, and anticipated key developments in science in general. His speculations on the origins of the universe, origins of life, the origins of the human species through labor, and the origins of the family were also enormously important for later theoretical developments.

The chapter in The Return of Nature that focuses on the significance of the Marxist natural-scientific, evolutionary, and ecological tradition, embodied in the work of thinkers such as J. B. S. Haldane, J. D. Bernal, Joseph Needham, Lancelot Hogben, and Hyman Levy in the 1930s and '40s, is entitled "The Return of Engels," since it was the rediscovery of Engels's dialectics of nature that constituted the initial basis for many of the revolutionary discoveries of the period, influencing the modern environmental movement.

DS and MW: How can this recovery of Engels's ecological thought change the way we understand the fate of dialectics of nature in the Soviet Union? The belief in a supposedly unbroken line of continuity between Engels and Stalinism still affects how many people in Central and Eastern Europe seem to think about this issue.

JBF: The issue of Soviet dialectical materialism is complex. And while I could discuss that at some length, I think it is most useful in this context—since a long disquisition would not be in order—to focus on the ecological aspects, which will get at many of the salient issues.

It should hardly surprise us that in the 1920s up to the mid-1930s the Soviet Union had the most advanced ecological science in the world, encouraged initially by none other than V. I. Lenin himself. Moreover, it was inspired in large part by Engels's dialectics of nature, as well as Marx's broad dialectical and historical materialism. Even those Soviet-era thinkers who were not Marxists were influenced by the dialectical conceptions emerging at the time. Geophysicist Vladimir Vernadsky developed the notion of the biosphere and biogeochemical cycles; geologist Aleksei Pavlov introduced the category of the Anthropogene Period (also referred to as the Anthropocene); Bolshevik revolutionary leader and theorist Nikolai Bukharin applied Vernadsky's concept of the biosphere to historical materialism and explored metabolism as constituting the basis of social and ecological equilibrium (although originally seen by him in rather mechanistic terms); biologist Alexander Oparin introduced the modern materialist theory of the origins of life (also developed at the same time by Haldane in England, who was influenced by Engels and Soviet thought); geneticist Nikolai Vavilov mapped the global sources of germplasm underlying the major crops; zoologist Vladimir Stanchinskii was the first to develop a rigorous energetic analysis of ecological communities and trophic levels, the editor of the USSR's first formal ecology journal, and the leading proponent of the Soviet zapovedniki, or scientific nature reserves; physicist Boris Hessen introduced the sociology of science and explored the significance of Engels's focus on the relations between the transmutation of matter and the transformation of energy; physicist B. Zavadovsky developed a powerful critique of vitalism in science; Nikolaevich Sukachev pioneered the analysis of swamp ecosystems that impressed Lenin in this respect. All of this was based on Marxian concepts of dialectical naturalism/materialism.

A number of these figures, namely, Bukharin, Vavilov, Zavadovsky, and Hessen, flew into London from Moscow in 1931 for the Second International Conference on the History of Science and Technology, where they had an enormous influence on socialist scientists in Britain such as Bernal, Needham, Hogben, Levy, and Haldane, leading to the tradition of "red science" in Britain that is explored in The Return of Nature. However, the impact of Stalinism (and Lysenkoism) was reflected in the fact that Bukharin, Vavilov, Zavadovsky, Hessen, and Stanchinskii were all eliminated in Stalin's purges. Their tradition of dialectical-materialist science lived on primarily in the work of the British red scientists who were directly influenced by them and who became emblematic of what I have called a "second foundation" within Marxian natural science.

In the Stalin period, dialectical materialism in the Soviet Union was reduced to a set of empty formulae and took various crude forms, including positivism. Nevertheless, there remained authentic dialectical-materialist thinkers in the natural sciences (and the arts) concerned with ecology who managed to survive, such as Sukachev, who introduced the notion of biogeocoenosis, constituting in many ways a more dialectical alternative to the ecosystem concept tied to the biosphere. Sukachev, at the head of Soviet science, was to declare war on Trofim Lysenko and eventually defeated the latter, which opened the way to the revival of Soviet environmental thought, the resurrection of the zapovedniki, and the rise of what I have called "late Soviet ecology" in the late 1970s and '80s. It is at this time, beginning in the 1960s, that the Soviet climatologists, notably those surrounding the extraordinary figure of Mikhail Budyko, played the leading part in introducing the notion of accelerated climate change, while also assuming a major role in the development of nuclear

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winter analysis. Soviet scientists and philosophers got together to develop the notion of "ecological civilisation," which was later adopted in China. In all of this, we can see the power of dialectical-materialist ways of thinking despite attempts to reduce it to a positivistic dogma, the very inverse of itself.

None of this is to deny the ecological failures of the Soviet state. But just as we would not want to judge the value of all environmental and critical thought in the West by the failures of the capitalist system, which is now pointing us toward the complete destruction of the planet as a safe home for humanity, putting the survival of numerous species in question, including our own, we should not discount the contributions of all critical Soviet thinkers on the basis of the errors made in the Kremlin.

DS and MW: How can this complicated Soviet legacy inform our thinking today?

JBF: The answer lies in your reference to "the complicated Soviet legacy." The Soviet Union (also including Soviet-type societies in general) cannot be treated as simply a monolithic society nor was its history a simple, continuous one. Rather, there were sharp breaks. In writing my article on "*Late Soviet Ecology and the Planetary Crisis*" in Monthly Review in June 2015, I looked at the three periods of Soviet history from an ecological perspective, represented by the period up to the mid-1930s, the core Stalin period beginning with the major purges, and then late Soviet ecology beginning with the thaw in the 1960s. What interested me, as indicated above, was that not only was the opening decade and a half in the Soviet Union, as is now well understood, a period of critical ecological advance, but also that this was not entirely destroyed in the Stalin period, and there was a new flowering of Soviet ecology near the end, arising principally out of the sciences. Moreover, the dialectical and materialist forms of thinking (to the extent that these persisted) led to very creative environmental insights along lines quite different from those in the West.

In late Soviet ecology, there was of course a greater emphasis on the possibilities of environmental planning as part of the overall planning process, which is very important compared to capitalism's anarchic market approach. And there was a significant unearthing of some of Marx's natural-scientific ideas. The notion of the creation of an "ecological civilisation" represented a kind of thinking that is hardly evident in the West even today. Budyko and the Soviet climatologists around him were in the 1950s and early '60s the largest group of climate scientists and the most advanced in the world, though this shifted decisively toward the United States by the mid-1960s. The emphasis on the biosphere and on concepts such as biogeocoenosis and biogeochemical cycles gave Soviet ecologists a more integrated Earth System view. It is remarkable even today to read Budyko's Global Ecology from the 1970s and compare it to what existed then in the West. There was something of a socialist ecological humanism that emerged in nascent form at this time.

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Of course, there were contradictions because dogmatism still persisted in core areas along with the belief in Promethean megaprojects, such as diverting rivers. But many of the ecological figures in science and philosophy broke decisively with that. The massive Soviet conservation movement was a scientist-led dissident movement that was gaining ground throughout the 1970s and '80s and

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DS and MW: You criticise the dualism of history and nature in Western Marxism and opt for a nuanced and nevertheless ontological understanding of the dialectics of nature. Why do you consider this ontological understanding important and how do you conceptualise the relation between the dialectics of nature and the dialectics of society?

JBF: The differentia specifica of "Western Marxism" as a philosophical tradition, separating it from other versions of Marxism, is its adherence to neo-Kantianism wherever questions of nature and society as well as ontology and epistemology are concerned. Western Marxism had its origins in footnote six of Georg Lukács's History and Class Consciousness in which he said that Engels, "following Hegel's mistaken lead," had extended dialectics "to apply also to nature," encompassing not only society and history, but external nature too. Yet, "the crucial determinants of dialectics" in the social sense, requiring reflexivity in relation to the human subject, Lukács said, "are absent from our knowledge of nature." From this arose what has long been regarded as the distinguishing feature of Western Marxism in its abandonment, on neo-Kantian grounds, of the dialectics of nature. Ironically, Lukács himself did not categorically reject the dialectics of nature. In fact, in a later chapter in History and Class Consciousness he stressed, in words similar to those of Engels, his acceptance of a "merely objective dialectics of nature," while emphasising that this was limited, and that dialectics in its most developed form was socially mediated and a subject-object relation. Moreover, one of the major themes in his work following History and Class Consciousness, starting with his Tailism manuscript just a few years later and extending to his Ontology of Social Being at the end of his life, was the conceptualisation of a dialectics of nature and society rooted in Marx's concept of social metabolism.

Still, within the Western Marxist tradition itself, evolving from History and Class Consciousness but rejecting the dialectics of nature much more fully than Lukács, there emerged a dualistic view in which the dialectical method applied only to history and society and not to the realm of nature, which was given over in its entirety to natural science and positivism. Marxism, therefore, restricted itself to an artificial "totality" that was entirely social and non-natural, divorced from the natural-material world, effectively excluding the entire physical universe. This conformed to the neo-Kantian view in which epistemology (or the theory of knowledge) subsumed ontology (or the nature of being), on the grounds that we could only really know the realm of the human subject, and not to any extent the external nonhuman world/universe—a view that critical realist philosopher Roy Bhaskar called the "epistemic fallacy."

Such a perspective, in which epistemology completely dominated over ontology, however, was no longer fundamentally materialist, but tended increasingly to idealist views. The materialist conception of history came to be divorced from the materialist conception of nature. The Vician view that we could understand history because we had made it concealed a dualism in which the larger material world outside of and even prior to human society was characterised as an other, the domain of mechanism and positivism, not Marxism and dialectics. In this view, there was no room within Marxism for a concrete analysis of nature, ecology, or even Darwinian evolution, which all lay beyond its purview. Hence, Western Marxism was not able to produce any genuine ecological analysis, only an endless rejection of positivism, and an abstract and ambiguous critique of the "domination of nature," which was little more than a critique of technology. This is not to deny that the Western Marxist philosophical tradition expanded our critical knowledge in many respects. But it was trapped in its own rejection of the material world beyond humanity as a universal other, a noumenon, or thing-in-itself.

In terms of why I consider ontology important, I would have to go back to my first conscious recognition of this in the 1970s through my encounter with István Mészáros's Marx's Theory of Alienation, which addressed human social ontology by means of an emphasis on the human being as the self-mediating being of nature. Mészáros, of course, drew this from Marx's Economic and Philosophical Manuscripts in which Marx, in his critique of G. W. F. Hegel's Phenomenology at the end of the Manuscripts, explains that human beings are corporeal beings and thus objective, sensuous, material beings insofar as the objects of their needs lie outside of themselves. Through the historical development of production, human beings thus become the self-mediating beings of nature, if nonetheless subject to self-alienation.

This is the place where the Economic and Philosophical Manuscripts end, but also the place where the German Ideology effectively begins, thus suggesting the lack of any epistemological break in Marx's thought in 1845–46. It is this ontological view, associated with Marx's theory of alienation, which is the starting point of historical materialism. But it emerges out of a deep materialist ontology. Beginning in the 1850s, under the influence of the work of his friend and revolutionary comrade, the physician-scientist Roland Daniels, author of Mikrokosmos, Marx began to conceptualise this ontological relation in production as the social metabolism between human beings and nature, out of which his most fundamental ecological conceptions eventually arose, and which lies at the centre of Lukács's social ontology.

I came to understand Marx's ontological analysis this way early on, in the 1970s, because of my study of Marx's Economic and Philosophical Manuscripts, Mészáros's Marx's Theory of Alienation, Lukács's 1967 preface to History and Class Consciousness, and the interviews of Lukács in Conversations with Lukács. My later study of Marx's materialism, going back to his doctoral thesis on Epicurus, his analysis of ecological metabolism, and Lukács's Ontology of Social Being, simply reinforced these views. This also overlaps with Joseph Fracchia's recent work in his Bodies and Artefacts on Marx as a theorist of corporeality. Without this ontological conception rooted in Marx's deep materialism there can be no coherent Marxist critique.

DS and MW: But couldn't this be compatible with an approach that insists nature is knowable through dialectics (e.g., because it is part of human history and consciousness) without insisting that dialectics is, as it were, "out there" in nature? What do you think would be lost with this approach?

JBF: I often refer to the specific realm of dialectics involving the direct interaction of nature and society as the dialectics of nature and society, since this is somewhat different from the dialectics of nature or the dialectics of society considered separately. Much of critical thought involving both the natural and social world, such as Lukács's Ontology of Social Being, can be seen as involving the dialectics of nature and society. But there are obviously aspects of nature—which can be seen as encompassing all of natural history and evolution in the universe as a whole—that have existed prior to and beyond the reach of humanity. Ontologically, humanity is part of "the universal metabolism of nature." Our knowledge of the external natural world is the result of our interactions with (and within) this universal metabolism, primarily through the "social metabolism" represented by human production. The material understanding derived from these interactions is then extended through scientific inferences to aspects of extra-human nature that are not immediately available to us. Thus, if we go back far enough in the history of physics, all the way to antiquity, we find that the earliest principles with which philosophers understood the universe beyond themselves were all based on scientific inferences arising out of our own immediate material experiences as they understood them at the time, from which they inferred the "nature of things" in the universe

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as a whole. The very fact that such an approach to scientific inference has a general validity from the standpoint of logic expresses the fact that nature is not simply "out there," but "in here" as well, in the sense that we are natural-material beings, and thus part of nature, as well as social beings. In fact, human society is an emergent form of nature with its own specific laws, but still subject to nature's broader laws.

Marx, building on his deep knowledge of Epicurean philosophy, always emphasised the human sensuous relation to nature, in which human beings were conceived as objective beings and therefore had their needs outside themselves. And, of course, Marx's notion of the social metabolism of humanity and nature through production stressed the dynamics of this relation within human history. He saw this sensuous interaction with the world as constantly extended and the knowledge this generated as attaining rational form within material science. Lukács, in his 1967 preface to History and Class Consciousness, agreed with Engels (and Marx) that, from an epistemological standpoint, humanity can also learn about external nature through scientific experiments. Hence, the Kantian thing-in-itself tends to recede as human production, knowledge, and science proceeds. All of this reflects our growing material knowledge of the natural world of which we are a part, and in all of this a dialectical, relational perspective is crucial.

Still, it remains a reality that the universal metabolism of nature necessarily extends beyond human interaction with it and thus any direct knowledge on our part. It would be both anthropocentric and unscientific to think otherwise. Hominins are only a few million years old, while most of the history of life and the universe precedes us and surrounds us, constituting the larger basis in which we exist. Humans thus exist alongside other forms of life and within the biogeochemical cycles of the Earth System as a whole. Understanding natural relations—which have to be approached dialectically and not in a mechanical way—thus requires a dialectics of nature, or what Engels and Lukács called the "merely objective dialectics," separate from direct human consciousness and action, and providing the basis for the more complete, reflexive dialectic, embodying human consciousness and subject-object relations.

Human beings are both an evolutionary product of nature and the self-mediating beings of nature, allowing us to perceive and act upon the world in meaningful, transformative ways. But just because of this we can also say that much of the universal metabolism of nature lies beyond our own corporeal existence, so that a "merely objective dialectics of nature," in which humanity itself is decentred, is also necessary. The continual fluctuations, dynamic interactions, complex evolutionary processes, and integrative levels that make up the universal metabolism of nature and constitute the realm of merely objective dialectics, give rise within human society—since humanity itself is an emergent part of nature—to powers of dialectical reason, enabling us to understand ourselves in connection with the changing material world around us. With this in mind, Marx in his Letters to Kugelmann referred to "the dialectical method," viewed in its most general sense, as nothing other than "the method of dealing with matter."

DS and MW: In contemporary debates, it is very common to see arguments that any distinction between humans and nonhuman nature is necessarily dualistic and anthropocentric. What do you see as the limits of that approach? Your own works suggest a more dialectical view.

JBF: The type of criticism that you mention has several different forms. One of these relates to the question of distinctions between human and nonhuman animals. Here the dominant Western position arising out of the Enlightenment was René Descartes's famous anthropocentric dualism in which he separated human beings with a soul/mind, on the one hand, from nonhuman animals on the other, whom he characterised as mere machines. Descartes went so far as to apply vivisection to his wife's dog to "prove" that it had no soul. Marx strongly criticised Descartes's

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view of animals as machines, insisting that this reflected the alienated, idealist viewpoint of the bourgeois order, arguing that in the medieval world nonhuman animals were seen not as machines but as "assistants" to human beings, a viewpoint with which Marx identified.

Marx was heavily influenced by the Epicurean materialist tradition, by Hermann Samuel Reimarus's theory of animal drives, and by Darwin's theory of evolution, all of which emphasised the close connections between human beings and nonhuman animals, departing from the Cartesian dualist tradition in this respect. Indeed, both Marx and Engels attributed most of the higher forms of consciousness and self-consciousness to nonhuman animals, but understood human labor as a new emergent form, in which human beings, due to their social organisation, became the self-mediating beings of nature on a level that was akin to—but qualitatively distinguished from, in terms of society, language, technology, and history—that of nonhuman animals. This was linked to evolutionary theory. In Engels's "The Part Played by Labour in the Transition from Ape to Man," one finds not only the highest conceivable estimation of the powers, including intellectual powers, of nonhuman animals, but also, as mentioned above, the most sophisticated nineteenth-century view of gene-culture coevolution, explaining the distinctive evolution of the human species. In this perspective, there are qualitative breaks represented by human evolution, but the kinship to nonhuman animals remains central to what Darwin called the evolutionary "descent of man."

In terms of broader criticisms charging Marxism with a dualism of human beings and nature, this is often based on a crude posthumanist rejection of Marxian dialectics as itself dualistic. This forgets that dialectics, and particularly Hegelian dialectics, has as its object overcoming dualism, based on an understanding of contradiction, change, mediation, negation, transcendence, and totality. Conversely, the equally simplistic (and non-dialectical) attempt to treat dialectics as simply absolute unity or a monistic worldview, merely removes the contradictions. As Lukács stated, Marxian dialectics is concerned with "the identity of identity and non-identity," not with their absolute conflation. Nor is today's popular hybridism a meaningful substitute for dialectics. In his Critique of Hegel's Philosophy of Right, Marx warned against the "unhappy hybrid in which the form betrays the meaning and the meaning the form."

Some thinkers have gone so far as to criticise Marx's dialectical theory of metabolic rift itself as dualistic, forgetting that the focus of Marx's analysis here was social metabolism (the labor and production process) constituting the mediation between humanity and the universal metabolism of nature, that is, nature as a whole. Mediation seen in relation to totality is, of course, at the core of the dialectical method. In the case of the metabolic rift, we are speaking of a disruption in the metabolism, or what Marx called the "alienated mediation" (and what Mészáros termed "second order mediations") between historical humanity and the rest of nature, constituting a fundamental ecological contradiction. This is, in fact, the way in which Marx constructed his ecological critique. To say that this is dualistic because there is humanity on one side and nonhuman nature on the other is to forget that humanity is part of nature, and that the material mediation of this relation, in the form of metabolism/production, is both the essence of the human connection to the earth and the basis of historical contradiction and change.

DS and MW: As you have indicated, the "metabolic rift" is a crucial concept in your thought. In your book with Brett Clark, *The Robbery of Nature*, you connect this to a "corporeal rift" within the human body itself. How do you

understand the relationship between these two rifts? Why do they remain central to understanding our contemporary world?

JBF: Marx's concept of metabolic rift is now so well known to socialist thinkers and activists that it does not require a detailed analysis here. It arose out of his understanding of the labor and production process as constituting the social metabolism, or the specifically human relation to the universal metabolism of nature. However, since capitalism is based from the start on the twofold alienation of nature and human labor and has as its singular object the accumulation of capital, rifts in the human metabolism of nature are an inherent part of the system. Marx first conceptualised the metabolic rift in terms of the soil fertility crisis in nineteenth-century England, whereby the soil nutrients were removed from the land in the food and fibre sent hundreds, and even thousands, of miles away to new urban centers. These nutrients did not return to the land, but became waste in the cities, which resulted in massive attempts to repair the declining soil fertility by importing natural fertilisers, such as guano from Peru, followed by the development of artificial fertilisers. From the very beginning, therefore, Marxian ecology was based on the notion of the continual disruption of biogeochemical cycles inherent to capitalism.

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The metabolic rift has often been interpreted simply in terms of the human relation to nonhuman nature. Nevertheless, human beings themselves, as corporeal beings, are an emergent part of nature and the metabolic rift also applies to the human body. Brett Clark and I therefore introduced the concept of the corporeal rift to address this problem. This is in fact consistent with Marx's whole conceptual framework. Thus, Marx, in referring to Engels's Condition of the Working Class in England two decades later in Capital, argued that the same general phenomenon of the disruption in nature's metabolism represented by the guano trade was also represented by the effects on human corporeal existence of the periodic epidemics facilitated by capitalist relations of production.

We therefore developed the concept of the corporeal rift to explain how capitalism creates rifts in human bodily existence, as in what Engels in his The Condition of the Working Class called "social murder." This allowed us to investigate in human-ecological terms such concrete historical issues as: (1) the extreme exploitation and shortening of the lives of workers; (2) the role of slavery (for example, the fact, discussed by Marx, that the slave-auction contracts between buyers and sellers of slaves often designated the life expectancy of slaves as no more than seven years); (3) the expropriation of women's labor and bodies associated with capitalist forms of social reproduction; (4) the genocide historically inflicted on Indigenous populations; and (5) the role of pandemics, as with COVID-19. The Robbery of Nature was particularly concerned with Marx's concept of expropriation as underlying the metabolic rift under capitalism, and how that affected human corporeality. We call this the problem of the robbery and the rift. The human body, in this view, is itself a site of ecological and social destruction. Naturally, the issue of corporeality can be applied to nonhuman animal bodies too, but our goal was specifically to capture the corporeal dimensions of the metabolic rift as they related to human beings.

DS and MW: Should we then see the concept of "corporeal rift" as extending and giving scientific grounding to the notion of alienation as it appears in Marx's early writings, perhaps in a similar way to how you describe the German Ideology picking up where the Economic and Philosophical Manuscripts left off?

JBF: If we look at Marx's discussion in the Economic and Philosophical Manuscripts, he proceeds from his famous discussion of the alienation of labor to the environmental and physiological effects of this alienation on human beings. Thus, he writes of the industrial worker: "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 to be understood in its literal sense) of civilisation—becomes an element of life for him. Universal unnatural neglect, putrefied nature, becomes an element of life for him." Marx is here describing a corporeal rift in human life resulting from the alienation of labor but extended to the degradation of the entirety of human existence, all that is associated with life.

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Interpretations of Marx's theory of alienation are often too narrow, focusing on the alienation of labor by itself, while failing to recognise the connection of the alienation of labor to the alienation of nature, and, with respect to humanity, the estrangement of human beings from their corporeal organisation, as living, breathing, objective beings. What we call "ecological destruction" is properly applied not only to external nature, but to human beings as corporeal beings as well. And all of this is of course related to alienation in its material dimensions.

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DS and MW: Your work argues—with Marx—that the metabolic rift can only be overcome in a society where the associated producers rationally regulate the metabolism between humanity and nature. In this context, how do you see the relationship between scientific knowledge and democratic control? In the current moment, we repeatedly hear calls to "listen to the science" that are combined with a technocratic mindset that is often suspicious of and hostile to democracy. How can we avoid this trap?

JBF: A fully rational science is incompatible with the logic of capital, which also means that science, although often corrupted and formally subsumed under capitalism, can never be absolutely subsumed by capital, and thus it frequently reemerges as an anticapitalist force. It is important to remember that Marx's Capital was a scientific project as well as a critique. Much of The Return of Nature is concerned with socialism and the development of ecological science. The method of science in the broadest sense, that is, in the way in which Marx and Engels referred to Wissenschaft as a system of learning, knowledge, and science, is the intellectual basis of all critique. In the historical materialist view, moreover, major breakthroughs in science tend to come from the bottom and from viewpoints outside the established system—if only because of the irrationalisms imposed by bourgeois society, including the role of idealism.

The social relations of science movement, inspired by J. D. Bernal's 1939 work The Social Function of Science, was supported by a majority of British scientists at the time, most of whom were on the left. It constituted a major attempt to challenge the system from the standpoint of science. It was Bernal who introduced the phrase "Science for the People" in his 1952 Marx and Science. It was in this period that Hogben and Haldane destroyed the genetic theory of race and eugenics in response to the racist distortions of science and ecology by figures like Jan Christiaan Smuts in South Africa. The modern ecological revolt itself began in the 1950s, when figures like Albert Einstein, Bertrand Russell, Linus Pauling, Bernal, and Barry Commoner organised against atmospheric nuclear testing following the disaster at Castle Bravo.

Rachel Carson came out of this same movement in science. Commoner's Science and Survival, which already raised the issue of global warming in the 1960s, was part of this struggle. Science for the People movements emerged in the 1970s in the United States and in Britain. In the United States, this was associated with such leading radical scientists as Richard Lewontin, Richard Levins, Gould, and Ruth Hubbard. In Britain, Hilary Rose and Steven Rose played leading roles.

The revolutionary scientific discoveries with respect to climate change were developed by scientists in the Soviet Union and the United States, and immediately generated radical questions about contemporary production. The definitive studies of nuclear winter within atmospheric science over the last thirty years have been opposed and suppressed by the Pentagon in its own treatments of the effects of nuclear war, but nonetheless the science cannot be denied. Genuine science has self-criticism as its basis, something that runs against the power of ideology.

That does not mean, of course, that science cannot be corrupted in various ways or manipulated by the system or employed in an elitist, formalistic, and technocratic manner, which is a big part of our reality. Capitalism necessarily distorts and corrupts science. But that is exactly why struggles over the social relations of science are necessary. It is therefore extremely important that Science for the People as an organisation and also as a magazine has been revived in the United States in recent years. Without critical science, there would be no science of ecology and virtually no possibility of an effective ecology movement. Marxists who see natural science as inherently technocratic, positivistic, and elitist are in many ways giving up the struggle at the outset, which cannot be carried out independently of science. It is worth looking at the very different attitudes toward science in Cuba, as represented by figures such as molecular immunologist Augustín Lage Dávila, for example, in his article "*Socialism and the Knowledge Economy*" published in the December 2006 issue of Monthly Review.

DS and MW: And we also see these elitist and technocratic approaches emerging in discussions of COVID-19.

JBF: In terms of COVID-19, we do see the manipulation of science by the establishment in various ways, sometimes to cover up failures. But we also see major advances in science coming to the fore. The work of critical epidemiologist Rob Wallace and his associates within Structural One Health, coming out of the historical-materialist tradition, have been extraordinarily important in bringing out the historical roots of the pandemic in capitalist global agribusiness and the circuits of capital, as well as the social factors that have led to its disproportionate impact on the most vulnerable sectors of society. We can in fact draw on a long history of socialist contributions to epidemiology from the time of Engels and Marx to the present, as Brett Clark, Hannah Holleman, and I explained in an article in Monthly Review in June 2021, entitled "*Capital and the Ecology of Disease*."

DS and MW: In the context of the ecological crisis, you write about the importance of transcending the capitalist form of value and emphasise the necessity of producing use values that meet genuine human needs. Is there a danger of technocracy when it comes to determining and promoting these needs? To use the language of another hero of The Return of Nature, William Morris, how do we determine the difference between "the vast quantity of useless things" produced by capitalism and that which meets real needs?

JBF: We live in a technologically mediated civilisation, so the danger of technocracy is always something to guard against. But much of this derives from the class basis and hierarchical structure of our society itself. Socialism in the twenty-first century demands substantive equality and ecological sustainability, both of which militate against

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hierarchical technocratic structures and capitalist monopolistic market mechanisms. We must remember that our most pressing problems today are not conducive to purely technological solutions but have to do mainly with social relations. Widespread education and active control from the bottom of society are key.

In terms of how we determine what are useless things, we have to be able first to analyse how various commodities fit into the structure of production and social needs. This is not as difficult as one might think. Marx was the first to refer to the "hierarchy of needs," not Abraham Maslow in the 1950s. In his "Notes on Adolph Wagner," Marx wrote of the "hierarchy of his [man's or humanity's] needs," which can clearly be given "a certain rank-ordering." This starts, of course, with our bodily needs. In the United States, three individuals own more wealth than the bottom 60 percent of the population. The inequality is so vast that the so-called masters of the universe at the top of the class pyramid have private jets and can take trips into outer space for the thrill of it, while much of the population in a rich country like the United States lacks clean water, clean air, adequate and nutritious food, housing, access to health care, transportation, decent education, connectivity, etc. Individual acquisition is put ahead of community relations and needs.

In a society that emphasises substantive equality and ecological sustainability, to determine that production should first satisfy the basic needs of all and to move forward from there.

It is certainly possible, in a society that emphasises substantive equality and ecological sustainability, to determine that production should first satisfy the basic needs of all and to move forward from there. Needs, moreover, do not come just in the form of commodities, but in the form of community, social relations, education, health, aesthetic enjoyment, human empowerment, etc. Use values are essentially qualitative and not simply representations of economic value, as in the case of exchange values. Morris decried the vast waste in society and the fact that people were compelled to carry out useless labor producing useless things, such as "barbed wire, 100-ton guns, sky signs, and advertising boards," and thus waste their working lives away. There is no doubt we can move more in the direction of rational, ecologically sustainable production, given the extreme forms of waste and destruction in the contemporary economy that exist only to absorb the enormous economic surplus of capitalism and to keep it going. In the United States, trillions of dollars are spent on marketing every year for the purpose of convincing people to buy things, resulting in a situation in which people neither need what they want nor want what they need.

Such "democratic control from below" in any real sense is impossible under capitalism. Nor, clearly, was it achievable in Soviet-type societies.

DS and MW: Could we say then that democratic control from below is itself a need, or perhaps that it is a necessary requirement for articulating and identifying our needs for social relations, community, empowerment, etc.?

JBF: I agree with this in general terms, but such "democratic control from below" in any real sense is impossible under capitalism. Nor, clearly, was it achievable in Soviet-type societies. From a long-range socialist perspective, it will be necessary to return to the notion of the "withering away of the state," viewed as a hierarchical structure standing above society. In his recently published posthumous work *Beyond Leviathan: Critique of the State*, Mészáros calls for the "progressive requisition of the alienated powers of decision-making" by society as a whole as represented by the "self-managing freely associated producer."

DS and MW: In recent years, it feels like politicians and theorists of the radical left have finally begun to catch up with the climate crisis, and there is a lively debate about both strategy (Green New Deals, degrowth, climate jobs, ecological Leninism) and tactics (direct action, electoralism, etc.). Where do you see the most hope for repairing the metabolic rift today?

JBF: In terms of "theorists of the radical left finally catching up with the urgency of the climate crisis," it is important to understand that thinkers on the left were leaders with respect to addressing the climate crisis as far back as the 1960s and '70s. One can point to socialists like Commoner, Virginia Brodine, Charles Anderson, and even Jürgen Habermas, who emphasised the dangers of climate change in the late 1960s and '70s. Anderson's book, inspired in part by Commoner, was entitled The Sociology of Survival and took the issues of global warming and ecological debt seriously. Of course, the greater part of the left ignored these questions at the time, as did society as a whole. Still, there is no sense in which socialist thinkers were behind in the development of ecological ideas, which arose particularly from the left.

I dealt with climate change and the whole question of the disruption of the earth's ecological cycles in my book *The Vulnerable Planet* in 1994 and have expanded that analysis ever since. Climate change, of course, is simply one part of our planetary ecological crisis, which is marked by the crossing of numerous planetary boundaries beyond which the earth is no longer a safe home for humanity. That means that the Anthropocene crisis goes well beyond climate change itself.

In terms of the debate on strategy, a lot of it doesn't get to the urgency of the issue or the scale of the change that is necessary. The notion of a Green New Deal actually started within the mainstream liberal/neoliberal tradition and was heavily promoted by certain business interests. Barack Obama even included it in his program when he ran for president in 2008, but then dropped it after being elected president. Generally, it is seen as a form of green Keynesianism. It was given a more radical form, emphasising a just transition and frontline communities by the U.S. Green Party and then adopted in a watered-down form by left Democrats. A more revolutionary version is conceived in terms of a People's Green New Deal as originally proposed by Science for the People, which I supported in an article entitled "*On Fire This Time*" in Monthly Review in November 2019. Max Ajl has done a service in promoting the notion of a global People's Green New Deal. Perhaps the deepest, most all-encompassing perspective along these lines is to be found in the Red Deal by the Red Nation, arising from Indigenous socialist activists in the United States.

Degrowth analysis has similarly varied between approaches that illogically perceive it as compatible with capitalism (such as Serge Latouche), all the way to ecosocialist approaches. In regard to the latter, we have published "*For an Ecosocialist Degrowth*" by Michael Löwy, Bengi Akbulut, Sabrina Fernandes, and Giorgos Kallis in the April 2022 issue of Monthly Review.

Andreas Malm has been advocating a war communism and ecological Leninism strategy since 2015, as evident in an essay he wrote on the subject for a book entitled The Politics of Ecosocialism, edited by Kasja Bornäs—a book to which I also contributed. His approach is certainly provocative and is superior to other approaches in that it is premised on recognition of the full gravity, immense scale, and unprecedented urgency of the problem and the idea that the only way out is revolutionary transformation. His most recent book in this line is Fighting in a World on Fire (2023).

My general approach to addressing the threat of the planetary rift, for example in my book *Capitalism in the Anthropocene*, published by Monthly Review Press in 2022, differs from, but is not in conflict with, the more radical of the strategies above. I have been less concerned with advocating a particular political-institutional mechanism than at looking at what has to be done if civilisation and humanity is to survive and emphasising the need for an ecological and social revolution, one which would necessarily extend beyond anything that humanity has ever seen before. Such a planetary ecological and social revolution would have to be based on what I have called an "environmental proletariat" reflecting a broader and deeper material struggle, embracing not only the working class, conceived in the broadest terms and focused on environmental (urban and rural) as well as economic workplace struggles, but also including the Landless Workers Movement (MST) in Brazil and similar movements, the international peasantry, and Indigenous peoples. The environmental proletariat seen in these deep materialist terms is most likely to emerge first as a vital revolutionary movement within the Global South and not within the fortresses of capitalism in the Global North. Yet, the nature of the planetary environmental crisis is such that the terrain of struggle will not be limited to any specific part of the planet. Nor can workable solutions be found on a planetary level unless humanity everywhere is mobilised to combat capitalism's tendency to produce an "irreversible rift in the interdependent process of social metabolism."

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The scale of the struggle before us, which will eclipse all previous movements and revolutions, is so enormous, necessarily mobilising hundreds of millions and even billions of people, that there is no sense in going too far in mapping out particular state-oriented, institutional solutions, which will be a product of the struggle itself and will vary from place to place, representing many different revolutionary vernaculars. Nevertheless, it is likely that the struggle, at least in the capitalist core, will have two phases, the first of which will be ecodemocratic, aimed at a kind of ecological popular front directed at the fossil fuel companies and financial capital, but pointing in an ecosocialist direction since going against the logic of capitalism; the second of which will take a form in which ecosocialism is dominant if there is to be any hope at all. What is certain is that we have to abandon capital accumulation as the driver of society. As the leaked 2022 IPCC climate mitigation report agreed to by scientists clearly indicated—prior to the censorship of this report by governments in the published version—what is required at this point is the adoption of new, low-energy solutions, necessitating vast changes in the structure of social relations.

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Taken as a whole, the various parts of the IPCC's Sixth Assessment Report of 2021–22 tell us that even in the most optimistic scenario the next few decades will be catastrophic for much of humanity all over the earth. The force of climate change is now bearing down on the world population. It is still possible, given revolutionary-scale transformations in production, consumption, and energy use, to avoid irreversible climate catastrophe, which would require that carbon dioxide emissions peak this decade and that we reach zero net emissions by 2050. The object is to stay well below a 2°C increase in global average temperature and remain on the 1.5°C pathway (which means not

overshooting it until 2040 and getting back down to a 1.4°C increase by the end of the century). Still, even then, the catastrophes threatening much of the world's population will be unprecedented compared to all previous human history. In these circumstances, we have shifted our emphasis in Monthly Review, as represented by our July–August 2022 issue on "Socialism and Ecological Survival," from simply emphasising the mitigation of climate change to what communities and populations need to do to protect themselves in the present and future, employing radical and revolutionary ecosocialist strategies.

Our hope is that, as people mobilise against the environmental conditions produced by the present social system that increasingly threatens their lives, they will also be animated to protect the earth as a home for humanity, carrying out a worldwide ecological and social revolution—the actual form of which is still to be determined. This is the great struggle of the twenty-first century: a struggle against planetary-scale ecological murder, or omnicide.

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