

17. The Metabolism of Twenty-First Century Socialism

One of the most important aspects of Marxist scholarship in recent decades has been the recovery and subsequent development of Karl Marx's argument on social and ecological metabolism, which occupied a central role in his critique of political economy. So central was this that Marx defined the labor process itself in metabolic terms. As he wrote in *Capital*: "Labour is . . . a process between man and nature, a process by which man . . . mediates, regulates and controls the metabolism between himself and nature."¹ Such a conception was two-sided. It captured both the social character of labor, associated with such metabolic reproduction, and its ecological character, requiring a continuing, dialectical relation to nature.

Although the key role played by the concept of metabolism in Marx's thought has been recognized for a long time, its full significance has rarely been grasped until recently. For example, in the 1920s, Georg Lukács emphasized the "metabolic interaction with nature" through labor as a key to Marx's dialectic of nature and society. However, he went no further in elaborating the concept.² Present-day attention to this theme has developed mainly along two lines: (1) Lukács's younger colleague István Mészáros's analysis of capital as a

historically specific system of *social metabolic reproduction*, and (2) the work of the present authors and others who have built on Marx's notion of a *metabolic rift* in the relation between nature and society.³ These two strands of Marxist analysis of the nature-society metabolism are dialectically linked. Mészáros's work has been primarily concerned with issues of *social* metabolic reproduction, but this has nonetheless generated some of the most penetrating and prescient analyses of the ecological problem. Recent Marxist work on *ecological* metabolism has converged with the dialectic of social metabolic reproduction, as outlined in Mészáros's *Beyond Capital*, in delimiting the conditions of a sustainable future society.⁴ Mészáros, in particular, emphasizes that the qualitative changes in the social order demanded by *ecology* are dialectically connected to a wider set of qualitative challenges—such as the necessity of social control and substantive equality—defining the struggle for a socialism for the twenty-first century.

Marx and Metabolism

The concept of metabolism was established within both chemistry and biology in the early nineteenth century for studying the chemical processes within organisms and the biological operations of organisms. It captures the complex biochemical process of exchange, through which an organism (or a given cell) draws upon materials and energy from its environment and converts these by various metabolic reactions into the building blocks of growth. The metabolism concept allowed scientists to document the specific regulatory and relational processes that direct interchange within and between systems—such as organisms digesting organic matter. Marx incorporated this concept, but in a much broader context, into all of his major political-economic works from the 1850s on, using it to analyze the dialectical relationship between society and nature.⁵ By necessity there is a “metabolic interaction” between humans and the earth, as the latter supports life. Labor is “an eternal natural necessity which mediates the metabolism between man and nature, and therefore human life itself.”

Through the labor process, humans transform the world and themselves, creating history in relation to the conditions of life.⁶

As a metabolic process, labor is thus, in Marx's conception, a life-giving process. This general approach conforms to modern science. As the great physicist Erwin Schrödinger wrote in his *What Is Life?* (1945):

How does the living organism avoid decay? The obvious answer is: By eating, drinking, breathing and (in the case of plants) assimilating. The technical term is *metabolism*. The Greek word . . . means change or exchange. Exchange of what? Originally the underlying idea is, no doubt, exchange of material. (E.g. the German for metabolism is *Stoffwechsel*). . . . What an organism feeds upon is negative entropy. Or, to put it less paradoxically, the essential thing in metabolism is that the organism succeeds in freeing itself from all the entropy it cannot help producing while alive.⁷

In a manner consistent with such conceptions, Marx's metabolic analysis viewed socio-ecological systems as depending for their regeneration upon specific metabolic processes involving complex historical relationships of interchange and reproduction.⁸ Due to the interpenetration of society and nature, humans have the potential to alter the conditions of life in ways that surpass natural limits and undermine the reproduction of natural systems. In assessing actual metabolic interactions, Marx examined the constantly evolving set of needs and demands that arose with the advent and development of the capitalist system, which transformed the social interchange with nature, directing it toward the constant pursuit of profit. He highlighted this change in *A Contribution to the Critique of Political Economy*, noting that “the exchange of commodities is the process in which the social metabolism, in other words the exchange of particular products of private individuals, simultaneously gives rise to definite social relationships of production, into which individuals enter in the course of this metabolism.”⁹ Use of the concept of metabolism here was meant to draw attention both to the metabolic exchange between nature and

humanity—the underlying condition of human existence—and also to the reality of social-metabolic reproduction. The latter expresses the fact that social formations as organic systems have to be seen as continuing and developing processes. They therefore need to be analyzed in terms of the totality of the relations of exchange, (and relations of social production/reproduction) that constitute them.

The constant reproduction of capital on an ever-larger scale intensifies the metabolic demands on nature, necessitating new social relations and forms of socio-ecological exchange. It is here that Marx's analysis throws light on the complex, developing forms of the estrangement and degradation of labor/nature in capitalist society. This is rooted, he tells us, in the alienation of human labor power (itself a natural agent) and, through this, the entire human-nature metabolism.

The Soil Nutrient Cycle and the Metabolic Rift

Marx coupled his metabolic analysis with his critique of political economy, illuminating how industrialized capitalist agriculture created a metabolic rift, which reflected the unsustainable practices of the system as a whole. Drawing upon the work of the great chemist Justus von Liebig and other scientists, Marx noted that the soil nutrient cycle necessitated the constant recycling of nitrogen, phosphorus, and potassium, as plants absorbed these nutrients. Plant and human wastes in pre-capitalist societies were generally returned to the soil as fertilizer, helping replace lost nutrients. But the enclosure movement and the privatization of land that accompanied the advent of capitalism created a division between town and country, displacing much of the population from the land and expanding the urban population. Intensive agricultural practices were used to increase yields. Food and fiber—along with soil nutrients—were shipped hundreds or even thousands of miles to distant urban markets. The essential soil nutrients accumulated as waste, which polluted cities and rivers. These practices undermined the natural conditions that were necessary for reproduction of the soil. Marx pointed out that capitalist agriculture

“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.”¹⁰ In other words, it was a robbery system exhausting natural wealth for the sake of private profit.

Large-scale, mechanized agriculture and long-distance trade intensify the metabolic rift in the soil nutrient cycle. Marx indicated that capital creates “the universal appropriation of nature,” as it attempts to subject natural laws and systems to the whims of accumulation. “It is destructive towards all of this [nature], 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.” Intensive, industrial agricultural practices are employed to sustain and increase production, as well as to overcome the limitations imposed by the nutrient cycle. Marx warned that the incorporation of industry into agriculture supplied the latter “with the means of exhausting the soil,” hastening the rate of environmental degradation.¹¹

In the mid-nineteenth century, intensive agricultural production in England and other core nations contributed to the global metabolic rift, as millions of tons of guano and nitrates—as well as various agricultural goods—from Peru, Chile, and elsewhere were transferred to the North to enrich depleted soils. Imported labor from China, “coolies,” worked under harsh conditions extracting guano from islands off the coast of Peru. These “beasts of burden” choked on guano dust, were physically beaten, and lived short lives to enrich the soils of the global North.¹²

The international fertilizer trade ushered in decades of civil unrest, war, debt, and global asymmetries in the international hierarchy of nations. The Haber-Bosch process, developed in Germany just prior to the First World War to overcome Britain's monopoly of Chilean nitrates, allowed for the fixation of nitrogen to produce ammonia on an industrial scale, facilitating the development of artificial fertilizers

by capitalists in the global North. This attempt at a technological fix increased the industrialization of agriculture, without attending to the source of the metabolic rift in agriculture. This shift in the socio-ecological relationship introduced additional ecological problems over the course of the twentieth century, such as the accumulation of nitrogen in waterways, contributing to the formation of dead zones.

Capital's insatiable appetite for ever-higher levels of profit and accumulation is reinforced by the domination of exchange value over use value, competition, and the concentration and centralization of capital. The impulse of incessant accumulation amplifies the social metabolism of society, increasing the demands placed on nature. New technologies are used above all to expand production and to lower labor costs. Capital's social metabolism is increasingly in contradiction with the natural metabolism, producing various metabolic rifts and forms of ecological degradation that threaten to undermine ecosystems.

Part of revealing the inherent destructiveness of capital is to lay bare the social relations of the system, emphasizing the possibility and necessity of social transformation in the mode of production. Marx argued that socialism offered the opportunity to pursue genuine human needs. At the same time, he emphasized that the transformation of property relations must also entail a systematic reorganization of the interchange with nature. He argued that a society of associated producers was necessary to "govern the human metabolism with nature in a rational way, bringing it under their collective control instead of being dominated by it as a blind power; accomplishing it with the least expenditure of energy and in conditions most worthy and appropriate for their human nature."¹³ An ecology that would maintain the earth for "succeeding generations," as Marx put it, would thus require transition to a new social order—presenting human civilization with its greatest and most urgent challenge.¹⁴ Although capitalism served to promote science, its rational application, he suggested, was only possible in a society of associated producers.

The Necessity of Social Control

The centrality of the human-social relation to nature, and the fact that it is mediated by the alienated labor that characterizes social existence under the regime of capital, is graphically illustrated in Mészáros's *Marx's Theory of Alienation*, winner of the 1971 Isaac Deutscher Prize. In a remarkable series of diagrams he provided a description of not only Marx's conception of the complex relation between humanity, nature, and labor, but also how humanity was doubly alienated, in terms of both alienated labor and alienated nature.¹⁵ In his Deutscher Prize lecture of that same year, Mészáros presented his emergent understanding of "the structural crisis of capital" as well as a powerful ecological critique that anticipated (but on far more radical foundations) the *Limits to Growth* argument unveiled by the Club of Rome in 1972.¹⁶ He criticized the advocates of capitalist development for their shortsighted promotion of the U.S. model of "high mass-consumption," pointing out that this approach was oblivious to natural limits—not to mention completely absurd given the inner dynamics of an economic system that generated wealth through the immiseration of most of humanity. He stressed a full four decades ago that this pattern could not be replicated throughout the world without causing immense environmental degradation and exhausting "the ecological resources of our planet."¹⁷

The ecological and social challenges that confront us are often minimized as the logic of capital goes unquestioned and various reforms are put forward (such as improving energy efficiency via market incentives) under the assumption that the system can be tamed to accommodate human needs and environmental concerns. Such positions fail to acknowledge that the structural determinations of capital will inevitably grind onwards, threatening to undermine the conditions of life, unless systematic change is pursued to eradicate the capital relation entirely. It is here that Mészáros presents a scathing critique of capital and its persistently destructive proclivities—all the while focusing on the necessity of a new social order.

Venezuelan President Hugo Chávez has referred to Mészáros as the “Pathfinder of Socialism,” emphasizing the importance of *Beyond Capital* for proposing a theory of transition.¹⁸ While Mészáros’s work is firmly rooted in Marx’s *critical method*, it stands apart as a foundational contribution in its own right. In *Beyond Capital* (as well as his other books), he establishes the basis for envisioning a future beyond the system of capital. He does this by pointing dialectically beyond Marx’s *Capital* to the necessity of a new theory of socialist transition for the twenty-first century. The “capital system” is conceived as a “social metabolic order” that permeates all aspects of society and that activates “absolute limits,” making this potentially the most dangerous period of human history. In focusing, like Marx himself, on the “capital relation,” rather than simply capitalism itself, Mészáros is able to account for the collapse of post-capitalist societies in terms of their failure to eradicate capital in its totality. In relation to the present structural crisis of capital, he illuminates both the anarchic forces that are undermining the social metabolic reproduction of the system and the necessity of social control for a genuine socialist transition. Both an ecologically sustainable social order and substantive equality are essential for human development. Without both of these components the survival of the human species remains threatened—whether from world war or ecological collapse.¹⁹

Environmental concerns, in this conception, do not constitute an isolated issue. Instead they are intimately tied to the social metabolic order, which requires confronting the question of social control. Yet the capital system itself is innately “uncontrollable.” It is driven inexorably, via the force of competition, to the incessant accumulation of capital, which concentrates social, economic, and political power. It imposes a particular form of rationality and interchange between human beings and nature, whereby all relationships are assessed in terms of their “productive viability” to facilitate expansion of the system.²⁰ The logic of capital is superimposed on everything, be it health care, education, manufacturing, or the environment. Exchange value becomes the universal measure, as owners attempt to maximize profit. The capital system is incapable of “self-sufficiency”; it must constantly be renewed, pushing

outwards, revolutionizing its relations of production, devouring more labor to capture surplus value, freely appropriating nature and subsuming the world to the accumulation process.²¹

Given the distorted accountancy of capital as a system, which includes exchange value but not use value, a “universal value-equation” dominates, “obliterating substantive incommensurability everywhere.” In other words, money serves as the universal medium of exchange, which extends commodity fetishism, erasing the social and natural processes—such as the time it takes for labor power to be reproduced or for trees to grow after being cut. Public wealth (the sum of use values, including natural wealth) is exploited and diminished for the sake of increasing private riches. Capital is predicated on constant growth, so it forever attempts to increase its turnover rate in order to accelerate accumulation.

Since exchange value is its exclusive focus, the social metabolic order of capital attempts to transcend whatever social or natural limits it confronts. As Mészáros puts it, “For the first time ever in history human beings have to confront a mode of social metabolic control which *can* and *must* constitute itself—in order to reach its fully developed form—as a *global* system, demolishing all obstacles that stand in the way,” regardless of “how devastating the consequences.”²² Its success is solely determined by the extent to which it can amass wealth at the top of the social pyramid. Like Marx in the *Grundrisse*, Mészáros warns that capital recognizes *barriers* that can be surmounted but not *boundaries* in the sense of absolute limits. It therefore incorporates in its inner logic a tendency to overshoot all objective limits, including the conditions for life.²³

Instead of the substantive equality necessary for universality in the social world, capitalism has produced inequality, unemployment, exploitation, human misery, war, and environmental degradation. The putative democracy offered to the world comes at the cost of disenfranchising the majority of the world’s population through alienating work environments, the ever-present threat of violence for participating in political opposition, and the undermining of subsistence production and the natural infrastructure.

Mészáros stresses that the reproduction of the capital system can only be secured through ever more destructive forms that further impoverish the world's population. Increasingly, consumption and destruction are coupled within the social metabolic order of capital, as destructive forces and wastefulness, such as the military-industrial complex, are pushed to the forefront to sustain an economic system that cannot be integrated politically on the global plane. Global war, even at the expense of mutual destruction, remains a means to secure the dominant position within an international system of competition.²⁴ Furthermore, the profit-driven system is incapable of effectively regulating the social metabolism between human society and nature. As capitalist production intensifies its demands on nature, the scale of ecological devastation will inevitably increase—the effects of which will outlast the transformation of the system.

In “The Necessity of Social Control” in 1970 Mészáros highlighted the culminating and deepening crisis. He explained that humanity must overcome the fragmentation of society and find unity if it is to survive. Here he focused on the relation of ecological degradation to capital's extreme uncontrollability:

Another basic contradiction of the capitalist system of control is that it cannot separate “advance” from *destruction*, nor “progress” from *waste*—however catastrophic the results. The more it unlocks the powers of productivity, the more it must unleash the powers of destruction; and the more it extends the volume of production, the more it must bury everything under mountains of suffocating waste. The concept of *economy* is radically incompatible with the “economy” of capital production which, of necessity, adds insult to injury by first using up with rapacious wastefulness the *limited resources* of our planet, and then further aggravates the outcome by *polluting and poisoning* the human environment with its mass-produced waste and effluence.

Ironically, though, again, the system breaks down at the point of its supreme power; for its maximum extension inevitably generates the vital need for restraint and *conscious control* with which capital production is structurally incompatible. Thus, the establishment of the new mode of

social control is inseparable from the realization of the principles of a *socialist economy* which centre on a *meaningful economy of productive activity*: the pivotal point of a rich human fulfillment in a society emancipated from the alienated and reified institutions of control.²⁵

Joseph Schumpeter's notion of “creative destruction,” itself derived from Marx, is seen by Mészáros as leading increasingly in late monopoly capitalism to a system of *destructive creation* (or destructive uncontrollability), characterized by systematic waste, chronic underutilization, environmental destruction, and both limited and potentially unlimited warfare.²⁶ This is the end of capitalism as a rational system. Establishment of a new system of social control, via a radical transformation of production and the human relationship to nature—resulting in a more sustainable social metabolic order—becomes an absolute necessity.

“The issue,” Mészáros makes clear, “is not *whether* or *not* we produce under *some* control, but under what *kind* of control; since our present state of affairs has been produced under the ‘iron-fisted control’ of capital which is envisaged, by our politicians, to remain the fundamental regulating force of our life also in the future.” Politics must be emancipated from the power of private capital, in order for people to gain rational *social control* over their productive lives—which includes the social metabolism with nature—and over human development. Rational planning by associated producers is thus an indispensable condition for the production and reproduction of a society of substantive equality and sustainable development.²⁷

The Absolute Limits of Capital and the Law of Laws

The necessity of social control is all the more vital when we consider what Mészáros calls the “absolute limits of capital,” especially in regard to the emerging ecological crisis. All social metabolic orders have “intrinsic or absolute limits which cannot be transcended” without forcing a qualitative transformation to a new mode of control.²⁸ In

such a situation, it becomes an imperative to transition to a new social metabolic order, but just because this is necessary does not mean it will happen. Mészáros warns that even though the absolute limits of capital may be activated, capital will not come to a halt and give up its expansive thrust. It may well push onward and overshoot those absolute limits.

The reality of this situation is evident in the rapidly developing planetary environmental crisis. The *Living Planet Report 2008* indicates that the world faces a “looming ecological credit crunch.” Natural resources are being consumed “faster than they can be replenished.” Ecosystems are being taxed and degraded due to excessive demands and pollution, threatening to push them to the point of collapse. The loss of habitat is causing cascading extinctions throughout nature, as part of the “sixth extinction.”

Recent studies have revealed that no area of the world’s oceans “is unaffected by human influence.” Coral reefs and continental shelves have suffered severe deterioration. Overfishing and organic pollution from agricultural runoff are driving the collapse of many aquatic ecosystems. The accumulation of carbon dioxide in the atmosphere has raised the ocean temperature and caused a drop in the pH of surface waters, making them more acidic, harming reef-building species. Scientists currently estimate that under business-as-usual emission of carbon dioxide, “the pH of the upper ocean” could produce as much “as a 150 percent increase in acidity compared with preindustrial times” with disastrous effects on ocean life. This has been dubbed “the other CO₂ problem.” Human society, controlled by a rapacious system of accumulation, is in the process of ecological overshoot, exceeding the earth’s “carrying capacity.” The global footprint has surpassed the ability of the planet to regenerate by over 30 percent.²⁹

The failure to act in the face of an environmental crisis of such scope should not come as a surprise given the union between politics and economics. Ironically, the destructive uncontrollability of capital prolongs the system’s capability to grow, as it increases the prospects of expanding private riches, profiting from scarcity and degradation. As Mészáros indicates, “neither the degradation of nature nor the pain

of social devastation carries any meaning at all for its system of social metabolic control when set against the absolute imperative of self-reproduction on an ever-extended scale.”³⁰

Surpassing the absolute ecological limits—to the point that the whole world is being run down—holds grave implications for the future of humanity. When the social metabolic order of capital confronts limits, “its destructive constituents come to the fore with a vengeance, activating the spectre of total uncontrollability in a form that foreshadows self-destruction both for this unique social reproductive system itself and for humanity in general.”³¹ It attempts to push ever forward—further undermining the vital conditions of existence—so long as there is a means to extend the accumulation of capital. The climate debate remains caught in the death throes of capital, as corporations, on one hand, clamor to present themselves as the solution to environmental degradation—a solution that has as its operative principle the defense of the existing social metabolic order, which must remain unchanged in all essential respects—and on the other hand, these same vested interests work to undermine even modest, utterly insufficient, political action to address climate change.³²

For Mészáros, the overthrow of capitalist institutions is only the first step in the development of a socialist society. The logic of capital “must be eradicated from everywhere” because of how “deeply embedded” it is in every pore of society, including the “social metabolic process.” A long, difficult struggle for social transformation must be undertaken to reorganize labor relations and conceptions of production, which at the same time will mend the rift between nature and society. Only the hegemonic alternative represented by labor in opposition to capital will provide the means for a transition to a new sustainable system of social metabolic reproduction. “The uncomfortable truth of the matter is that if there is no future for a radical mass movement in our time, there will be no future for humanity,” because “the *extermination of humanity* is the ultimate concomitant of capital’s destructive course of development.”³³

Mészáros does not limit his conception of the “absolute limits” of the system to environmental conditions. Nor is his notion of historical

agency confined to labor in a narrow sense that excludes the role of other social movements (such as those based on or rooted in gender/sexual orientation, race/ethnicity/nationality, the unemployed). Thus Mészáros addresses the relation between the “activation of capital’s absolute limits” in ways that encompass not only the environment but also these other issues, particularly women’s emancipation. Just as the hierarchically driven, quantitative expansion built into capital’s system of social metabolic reproduction has put it increasingly in conflict with the planetary “macrocosm” so is it put in conflict with the “microcosm” of the family in its various manifestations within the system. Given the unequal gender relations that are inscribed in the family, partly related to the regulation of human reproduction, and partly to the reproduction of authoritarian systems of control, the substantive equality that women’s emancipation requires is negated by this reality alone.

According to Mészáros, “the economically sustainable regulation of humanity’s biological reproduction is a crucial primary mediatory function of the social metabolic process.” Under capital this necessary relation is completely subordinated to the management of labor and production so as to promote continued accumulation. The capital system is therefore unable to tolerate full gender equality. The “class of women,” he writes, “cuts across all social class boundaries,” making the demand for the “emancipation of women” the Achilles’ heel of advanced monopoly capitalism. Women in this view can achieve full emancipation only through the emancipation of society in general. This, however, poses a challenge to the nuclear family, with its internal hierarchy that constitutes the micro-foundation of the system. Such an emancipatory project extends the question of substantive equality to all domains of social existence.³⁴

Mészáros’s argument in this respect suggests the possibility of a larger synthesis with the important work of socialist, ecofeminist Ariel Salleh, who has been focusing on the question of “meta-industrial labor”—those workers, primarily women, peasants, the indigent, whose daily work is directed at biological growth and regeneration (including regeneration of natural systems). Salleh argues that

such “meta-industrial” workers are directly connected to issues of eco-sufficiency and sustainability and offer all sorts of possibilities of overcoming the metabolic rift between humanity and nature, creating a new “metabolic fit” with respect to socio-ecological reproduction. Indeed, meta-industrial labor is directed at promoting what she calls the “metabolic value” required by all organic systems, protecting them against entropy. Such meta-industrial labor is to be seen as “rift-healing.” “The material bottom line of any economy,” she writes, “is a flourishing ecosystem and this can only be represented by metabolic value.” In today’s hierarchical world order, those responsible for this ecological bottom line are clearly women and other “carers” (caregivers, care workers), together with peasants, and indigenous peoples. All of this is connected to the issues of “substantive equality” and qualitative human development raised by Mészáros in relation to the dialectical necessity of social-ecological metabolism. For Salleh, capitalist societies metaphorically owe a vast “embodied debt” to unpaid reproductive workers engaged in the regeneration of the underlying conditions of production.³⁵

Elementary Triangles: A Sustainable System of Social Metabolic Reproduction

Waiting and wishing for social change will not eliminate exploitation, social inequalities, and environmental destruction. Fortunately, the activation of capital’s absolute limits, including its absolute ecological limits, coincides with new sources and strategies of mass-based revolt associated in particular with the rise of a socialism for the twenty-first century in Latin America, which has been directly influenced by Mészáros’s thinking. Hugo Chávez has drawn directly on Mészáros in developing Venezuela’s Bolivarian Revolution along socialist lines. As Michael Lebowitz states in *The Socialist Alternative*, “Chávez’s theoretical step [in introducing the idea of a ‘triangle of socialism’] can be traced to Mészáros’s *Beyond Capital*,” where capitalism was conceived as an organic system involving “a specific combination of production-

distribution-consumption”—one in which all the elements coexist and simultaneously support one another.” A socialist experiment must supersede, as Mészáros insisted, all the elements of “the totality of existing reproductive relations to go “beyond capital.”

The result of this conception was a more ambitious, and at the same time more concrete, notion of socialist transition. Chávez was especially influenced by Mészáros’s notion of a “communal system of production and consumption,” in which the exchange of activities dominates over abstract exchange values.³⁶

This more complex notion of socialism as an alternative hegemonic product aimed at sustainable development and substantive equality—requiring a new interrelated system of social metabolic reproduction, and rooted in a system of communal production and exchange—has facilitated a dialectical understanding of social-ecological metabolism. This emerging dialectic has become a defining feature of twenty-first century socialism, which is second to none in its perception of ecological imperatives. In *The Structural Crisis of Capital*, Mészáros quotes Chávez as stating: “I believe that it is not given to us to speak in terms of future centuries . . . we have no time to waste; the challenge is to save the conditions of life on this planet, to save the human species, to change the course of history, to change the world.”³⁷

The path to a sustainable society, in this view, necessitates social control over the social metabolic order of reproduction, encompassing all realms of productive life, including what is produced and how it is produced, as well as social relations with nature. Marx argued that a society of associated producers must live within the “metabolism prescribed by the natural laws of life itself” to sustain the vital conditions of existence for present and future generations. This conception is not simply a question of sustaining human conditions, since a metabolic approach means that ecosystems need to continue to function and provide the various ecological services that enrich the world and support other life forms.³⁸

There has arisen a vital synthesis between Marx and Mészáros in formulating a conception of transition to a sustainable system of social metabolic reproduction. Both substantive equality and ecological sus-

tainability are the cornerstones of a society freed from the dictates and logic of capital. Substantive equality (what Simón Bolívar called “the law of laws”) helps overcome the divisions, the social isolation, and the alienation that characterize capitalist relations.³⁹ Ecological sustainability involves transcending the alienation from nature, which is the precondition for the capitalist system of production and exploitation.

Influenced by Marx’s conception of a society of associated producers and drawing directly on Mészáros’s theory of transition, Hugo Chávez has proposed a new socialism for the twenty-first century rooted in the “elementary triangle of socialism.” This triangle consists of: (1) social ownership, (2) social production organized by workers, and (3) satisfaction of communal needs. Social control serves as the root basis for this transformation to a socialist metabolic order. If socialism fails to embody all sides of the triangle simultaneously, it will not take hold and will cease to be sustainable.⁴⁰

It is clear that this *elementary triangle of socialism* is dialectically interconnected at a more fundamental level with what could be called the *elementary triangle of ecology*, as delineated by the natural laws of life: (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. Marx insisted that human development must be rooted in sustainable human relations with the material world, demanding constant vigilance and a scientifically informed public.⁴¹ As a result, the two triangles must become one, allowing “an entire society . . . to bequeath [the earth] in an improved state to succeeding generations.”⁴²

In gaining social control over the social metabolic order, Mészáros emphasizes, we must eradicate the capital relation, constructing an entirely new foundation for society. This radical reorientation toward substantive equality is particularly evident, as noted, in the struggles today associated with the Bolivarian revolution in Venezuela and elsewhere in Latin America. In Venezuela, a historic transformation is under way, as a nation and its people work to transition to socialism. This is a process whereby the logic of capital must be uprooted, and

the logic of a sustainable, human society sown. Major strides have been taken to establish communal councils, to encourage cooperatives, to create worker councils, to increase the education of workers, to train workers in co-management and self-management, and to extend social control over production. These steps are part of an effort to empower and invest people in the social transformation, which, as Chávez explains, also facilitates “the construction of the new man, of the new woman, of the new society.”

To some extent, the fact that Venezuela’s economy is heavily dependent on fossil fuels poses a contradiction in this respect, though one not internal to Venezuela itself but a product of the whole nature of development and energy-use in the capitalist world economy. Given the historical conditions of Venezuela in this respect, the question becomes not so much the export of oil but of how the proceeds are being used to transform the economy and society in a sustainable direction. Oil revenues have funded many projects, including programs to increase health care and education, within Venezuela. As part of the revolutionary process, an attempt is being made to diversify internal production to reduce the need to import goods to meet human needs. Here production is being focused on “stimulating the full development of human beings.”

These changes may open up more revolutionary possibilities as a new society is created. In January 2010, Chávez announced that Venezuela must move beyond the oil-rentier development model as part of its transition. What this will mean in practice only time will tell. Nevertheless, peak oil may force a transformation to a less resource-extractive society. The more Venezuela has moved toward food self-sufficiency and ecological sustainability the easier such a transformation will be.⁴³

Similar contradictions and initiatives are evident in Ecuador, which under its current president, Rafael Correa, has embraced the cause of a socialism for the twenty-first century and has joined Venezuela, Cuba, Bolivia, and other countries in the Bolivarian Alliance for the Peoples of Our America (ALBA). Ecuador has been the site of one of the highest rates of deforestation in South America as well as uncontrolled oil

extraction. For the last seventeen years, Chevron and some 30,000 Ecuadorians have been involved in a legal dispute over water and land contaminated by oil spills and toxic open waste pits. In opposition to the capital system’s unlimited extractive economy, Ecuador’s new constitution introduces the Rights of Nature as a constitutional principle integrated with the concept of the Good Life (*Sumak Kawsay*). This makes Ecuador the first country in the world to recognize the rights of nature and of ecosystems to survive and flourish, allowing citizens to sue on nature’s behalf if these rights are infringed.

Although Ecuador is an oil exporter, with oil currently accounting for 60 percent of exports, Correa has come out in favor of what is called the *Daly-Correa* tax on exports of oil (named after Correa and ecological economist Herman Daly) to help fund energy and nature conservation. The Ecuadorian government has also proposed, in what is called the *ITT Yasuní Initiative*, leaving 20 percent of Ecuador’s total oil reserves—within the *Ishpingo Tambococha-Tiputini (ITT) corridor* (a 675-square-mile area)—in the ground forever. The goal is to protect the *Yasuní National Park* area, one of the world’s greatest sites of biological diversity.

The UN-backed plan, to be administered by the UN Development Programme, which signed an agreement with Ecuador in August 2010, would result in some 846 billion barrels of crude oil being permanently left in the ground, preventing carbon emissions in excess of the total annual emissions of France. Ecuador is asking for rich countries to provide some \$3.6 billion in compensation, half of the market value of the oil to remain in the ground. The money received would be used to develop alternative energy in order to lessen Ecuador’s oil dependence, and to introduce projects/measures to lessen illegal logging in the Ecuadorian Amazon. The plan would give countries that contribute to the compensation fund what are known as *Yasuní Guarantee Certificates (CGYs)* in Spanish based on the value of the non-emitted carbon dioxide their contribution has secured. If a future Ecuadorian government goes back on the commitment not to drill for oil in the area, the value of these certificates would have to be paid back with interest.

The area to be protected in the heart of the Ecuadorian Amazon is one of the most ecologically diverse areas of the world. One hectare contains more tree species than all of the United States and Canada combined, as well as more than 500 bird species, 200 mammal species, 105 amphibian species, and countless plants and insects. The Yasuní National Park is the ancestral home of two of the world's last remaining "uncontacted" indigenous tribes, the Taromenane and the Tagaeri. The *Independent* (UK) has called the ITT Yasuní Initiative "the world's first genuinely green energy deal."⁴⁴

Significant attempts to alter the human metabolism with nature are being made through agrarian reform as part of the Bolivarian revolutionary process. Throughout much of the twentieth century, Venezuela's agricultural sector was dismantled, and the rural population migrated to cities. The nation became dependent on food imports. As part of the effort to establish a social economy—which is focused on use values—and to pursue human development, the Bolivarian Revolution has committed itself to pursuing "food sovereignty." Under this framework, small farmers and collectives rather than agribusiness have control over food production and distribution. This change helps reduce alienation from nature. Education has become integral to the production process, as the farmers and agricultural centers are increasingly concerned with the natural conditions under which food is produced. Agroecological approaches are being studied and applied, in order to build up the soil and to work within natural cycles. Farmers are planting diverse traditional crops, saving seeds, and collecting compost. The government is supporting these efforts by extending credit to those who use them. Like Cuba, Venezuela has created research facilities to develop "biological pest control and fertilizers" to eliminate the use of pesticides. The Law for Integrated Agricultural Health (2008) mandates that the use of "toxic agrochemicals" be phased out, in favor of agroecological practices.⁴⁵ Here the elementary triangles of socialism and ecology intersect as the revolutionary process continues to take root.

Under the presidency of Evo Morales, a socialist and the first indigenous Bolivian head of state, Bolivia, like Venezuela, has pushed

forward an agenda aimed at ecological and social justice. Morales rose to power partly as a result of the Cochabamba water wars, in which the poor and indigenous populations rose up against water privatization. With the rise of Morales, Bolivia has come to play a leading role within the world in opposing the ecological depredations of capitalism and promoting radical ecological change. Not only did Bolivia host the World People's Conference on Climate Change and the Rights of Mother Earth in April 2010, it also played the primary role in this context in issuing the *Cochabamba Protocol* or *The People's Agreement on Climate Change and the Rights of Mother Earth*—the leading third world revolutionary strategy for addressing the global ecological crisis. According to the *Cochabamba Protocol*, "Humanity confronts a great dilemma: to continue on the path of capitalism, depredation and death, or to choose the path of harmony with nature and respect for life."⁴⁶

All of this suggests that the struggle for socialism in the twentieth century arises out of a dual struggle for substantive equality and ecological sustainability, as mutually dependent conditions of revolutionary change. In Mészáros's conception, the creation of a more ecological relation for humanity is not a separate problem—but an indispensable, even defining (though not all-encompassing) part of the struggle to create a qualitatively new social order dedicated to the realization of genuine human needs. Ecological struggle in the abstract in this view is meaningless, since it cannot be achieved except as part of a wider social revolt that encompasses the totality of human relations: not just those with nature directly. As he writes in *The Challenge and Burden of Historical Time*, "Ecology . . . is an important but subordinate aspect of the necessary *qualitative redefinition* of utilizing the produced goods and services, without which the advocacy of humanity's permanently sustainable ecology—again, an absolute must—can be nothing more than a pious hope."⁴⁷ Such a qualitative redefinition relates of course to the creation of a culture of substantive equality.⁴⁸

In this universal, dialectical view, the problem of constructing a viable system of social and ecological metabolism becomes—in con-

tradistinction to the *Limits to Growth* argument, which targets the abstract commitment to “growth” rather than the capital system itself—a central aspect of a wide-ranging revolutionary process. This process demands for its completion *social* control: wresting the determining power away from the agency of *capital* and placing it back in the sovereign population. It is a matter of “putting to humanly commendable and rewarding use the attained *potential* of productivity, in a world of now criminally wasted material and human resources.”⁴⁹ Repairing the rift in the ecological metabolism requires that the rift in the social metabolism be overcome.

18. Why Ecological Revolution?

It is now universally recognized within science that humanity is confronting the prospect—if we do not soon change course—of a planetary ecological collapse. Not only is the global ecological crisis becoming more and more severe, with the time in which to address it fast running out, but the dominant environmental strategies are also forms of denial, demonstrably doomed to fail, judging by their own limited objectives. This tragic failure can be attributed to the refusal of the powers that be to address the roots of the ecological problem in capitalist production and the resulting necessity of ecological and social revolution.

The term “crisis,” attached to the global ecological problem, although unavoidable, is somewhat misleading, given its dominant economic associations. Since 2008, we have been living through a world economic crisis—the worst economic downturn since the 1930s. This has been a source of untold suffering for hundreds of millions, indeed billions, of people. But insofar as it is related to the business cycle and not to long-term factors, expectations are that it is temporary and will end, to be followed by a period of economic recovery and renewed growth—until the advent of the next crisis. Capitalism is, in this sense, a crisis-ridden, cyclical economic system. Even if we were to go further, to conclude that the present crisis of accumulation is part of a long-