

The Planetary Emergency :: Monthly Review

John Bellamy Foster and Brett Clark more on Economics, Environment/Science, Marxist Ecology

[The Planetary Emergency](#)

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Capitalism today is caught in a seemingly *endless crisis*, with economic stagnation and upheaval circling the globe.¹ But while the world has been fixated on the economic problem, global environmental conditions have been rapidly worsening, confronting humanity with its *ultimate crisis*: one of long-term survival. The common source of both of these crises resides in the process of capital accumulation. Likewise the common solution is to be sought in a “revolutionary reconstitution of society at large,” going beyond the regime of capital.²

It is still possible for humanity to avert what economist Robert Heilbroner once called “ecological Armageddon.”³ The means for the creation of a just and sustainable world currently exist, and are to be found lying hidden in the growing gap between what could be achieved with the resources already available to us, and what the prevailing social order allows us to accomplish. It is this latent potential for a quite different human metabolism with nature that offers the master-key to a workable ecological exit strategy.

The Approaching Ecological Precipice

Science today tells us that we have a generation at most in which to carry out a radical transformation in our economic relations, and our relations with the earth, if we want to avoid a major tipping point or “point of no return,” after which vast changes in the earth’s climate will likely be beyond our ability to prevent and will be irreversible.⁴ At that point it will be impossible to stop the ice sheets in Antarctica and Greenland from continuing to melt, and thus the sea level from rising by as much as “tens of meters.”⁵ Nor will we be able to prevent the Arctic sea ice from vanishing completely in the summer months, or carbon dioxide and methane from being massively released by the decay of organic matter currently trapped beneath the permafrost—both of which would represent positive feedbacks dangerously accelerating climate change. Extreme weather events will become more and more frequent and destructive. An article in the *Proceedings of the National Academy of Sciences* demonstrated that the record-breaking heat wave that hit the Moscow area in 2010 with disastrous effect was made five times more likely, in the decade ending in that year as compared with earlier decades, due to the warming trend, implying “an approximate 80% probability” that it “would not have occurred without climate warming.” Other instances of extreme weather such as the deadly European heat wave in 2003 and the serious drought in Oklahoma and Texas in 2011, have been shown to be connected to earth warming. Hurricane Sandy, which devastated much of New York and New Jersey at the end of October 2012, was impacted and amplified to a considerable extent by climate change.⁶

The point of irreversible climate change is usually thought of as a 2°C (3.6°F) increase in global average temperature, which has been described as equivalent at the planetary level to the “cutting down of the last palm tree” on Easter Island. An increase of 2°C in global average temperature coincides roughly with cumulative carbon emissions of around one trillion metric tons. Based on past emissions trends it is predicted by climate scientists at Oxford University that we will hit the one trillion metric ton mark in 2043, or thirty-one years from now. We could avoid emitting the trillionth metric ton if we were to reduce our carbon emissions beginning immediately by an annual rate of 2.4 percent a year.⁷

To be sure, climate science is not exact enough to pinpoint precisely how much warming will push us past a planetary tipping point.⁸ But all the recent indications are that if we want to avoid planetary disaster we need to stay considerably *below* 2°C. As a result, almost all governments have signed on to staying below 2°C as a goal at the urging of the UN's Intergovernmental Panel on Climate Change. More and more, 2°C has come to symbolize the reality of a planetary point of no return. In this sense, all the discussions of what the climate will be like if the world warms to 3°C, or all the way to 6°C, are relatively meaningless.⁹ Before such temperatures are attained, we will have already reached the limits of our ability to control the climate-change process, and we will then be left with the task of adapting to apocalyptic ecological conditions. Already Arctic sea ice experienced a record melt in the summer of 2012 with some scientists predicting an ice-free Arctic in the summer as early as 2016–2020. In the words of James Hansen, the world's leading climatologist, we are facing a “planetary emergency”—since if we approach 2°C “we will have started a process that is out of humanity's control.”¹⁰

Given all of this, actually aiming for the one trillion metric ton mark in cumulative carbon emissions, or a 2°C increase in global temperature, would be courting long-term disaster. Some prominent climate analysts have proposed a target of staying below 750 billion cumulative metric tons of carbon—estimated to provide a 75 percent chance of staying below the climate-change tipping point. At current rates of carbon emissions it is calculated that we will reach the 750 billion metric tons mark in 2028, or sixteen years. We could avoid emitting the 750 billionth metric ton if we were to reduce our carbon emissions beginning immediately at an average annual rate of 5.3 percent.¹¹ To get some perspective on this, the *Stern Review on The Economics of Climate Change* issued by the British government in 2007, which is generally seen as representing the progressive side of the carbon debate, argued that a reduction in emissions of more than a 1 percent annual rate would generate a severe crisis for the capitalist economy and hence was unthinkable.¹²

Many thought that the Great Financial Crisis would result in a sharp curtailment of carbon emissions, helping to limit global warming. Carbon emissions dipped by 1.4 percent in 2009, but this brief decline was more than offset by a record 5.9 percent growth of carbon emissions in 2010, even as the world economy as a whole continued to stagnate. This rapid increase has been attributed primarily to the increasing fossil-fuel intensity of the world economy, and to the continued expansion of emerging economies, notably China.¹³

In an influential article published in *Nature Climate Change*, “Asymmetric Effects of Economic Decline on CO₂ Emissions,” Richard York used data for over 150 countries between 1960 and 2008 to demonstrate that carbon dioxide emissions do not decline in the same proportion in an economic downturn as they increase in an economic upturn. Thus for each 1 percent in the growth of GDP per capita, carbon emissions grew by 0.733 percent, whereas for each 1 percent drop in GDP, carbon emissions fell by only 0.430 percent. These asymmetric effects can be attributed to built-in infrastructural conditions—factories, transportation networks, and homes—meaning that these structures do not disappear during recessions and continue to influence fossil-fuel consumption. It follows of necessity that a boom-and-bust economic system cannot reduce carbon emissions; that can only be achieved by an economy that reduces such emissions on a steady basis along with changes in the infrastructure of production and society in general.¹⁴

Indeed, there is reason to believe that there is a strong pull on capitalism in its current monopoly-finance phase to seek out more fossil-fuel intensive forms of production the more deeply it falls into the stagnation trap, resulting in repeated attempts to restart the growth engine by, in effect, giving it more gas. According to the Low Carbon Index, the carbon intensity of world production fell by 0.8 percent in 2009, and by 0.7 percent in 2010. However, in 2011 the carbon intensity of world production rose by 0.6 percent. “The economic recovery, where it has occurred, has been dirty.”¹⁵ The notion that a stagnant-prone capitalist growth economy (what Herman Daly calls a “failed growth economy”) would be even more intensively destructive

of the environment was a thesis advanced as early as 1976 by the pioneering Marxist environmental sociologist Charles H. Anderson. As Anderson put it, “as the threat of stagnation mounts, so does the need for throughput in order to maintain tolerable growth rates.”[16](#)

The hope of many that peak crude oil production and the end of cheap oil would serve to limit carbon emissions has also proven false. It is clear that in the age of enhanced worldwide coal production, fracking, and tar sands oil there is no shortage of carbon with which to heat up the planet. Today’s known stocks of oil, coal, and gas reserves are at least five times the planet’s remaining carbon budget, amounting to 2.8 gigatons in carbon potential, and the signs are that the capitalist system intends to burn it all.[17](#) As Bill McKibben observed in relation to these fossil-fuel reserves: “Yes, this coal and oil is still technically in the soil. But it’s already economically aboveground.”[18](#) Corporations and governments count these carbon resources as financial assets, which means they are intended for exploitation. Not too long ago environmentalists were worried about the world running out of fossil fuels (especially crude oil); now this has been inverted by climate-change concerns.

As bad as the climate crisis is, however, it is important to understand that it is *only a part of the larger global ecological crisis*—since climate change is merely one among a number of dangerous rifts in planetary boundaries arising from human transformations of the earth. Ocean acidification, destruction of the ozone layer, species extinction, the disruption of the nitrogen and phosphorus cycles, growing fresh water shortages, land-cover change, and chemical pollution all represent global ecological transformations/crises. Already we have crossed the planetary boundaries (designated by scientists based on departure from Holocene conditions) not only in relation to climate change, but also with respect to species extinction and the nitrogen cycle. Species extinction is occurring at about a thousand times the “background rate,” a phenomenon known as the “sixth extinction” (referring back to the five previous periods of mass extinctions in earth history—the most recent of which, 65 million years ago, resulted in the extinction of the dinosaurs). Nitrogen pollution now constitutes a major cause of dead zones in oceans. Other developing planetary rifts, such as ocean acidification (known as the “evil twin” of climate change since it is also caused by carbon emissions), and chronic loss of freshwater supplies, which is driving the global privatization of water, are of growing concern. All of this raises basic questions of survival: the ultimate crisis confronting humanity.[19](#)

The Ultimate Crisis

The scale and speed of the emerging ecological challenge, manifested not only in climate change but also in numerous other planetary rifts, constitutes irrefutable evidence that the root cause of the environmental problem lies in our socioeconomic system, and particularly in the dynamic of capital accumulation.

Faced with such intractable problems, the response of the dominant interests has always been that technology, supplemented by market magic and population control, can solve all problems, allowing for unending capital accumulation and economic growth without undue ecological effects by means of an absolute decoupling of growth from environmental throughput. Thus, when asked about the problems posed by fossil fuels (including tar sands oil, shale oil and gas, and coal) President Obama responded: “All of us are going to have to work together in an effective way to figure out how we balance the imperative of economic growth with very real concerns about the effect we’re having on our planet. And ultimately I think this can be solved with technology.”[20](#)

Yet, the dream that technology alone, considered in some abstract sense, can solve the environmental problem, allowing for unending economic growth without undue ecological effects through an absolute decoupling of one from the other, is quickly fading.[21](#) Not only are technological solutions limited by the laws of physics, namely the second law of thermodynamics (which tells us, for example, that free and complete recycling is impossible), but they are also subject to the laws of capitalism itself [22](#) Technological change under the

present system routinely brings about *relative* efficiency gains in energy use, reducing the energy and raw material input per unit of output. Yet, this seldom results in *absolute* decreases in environmental throughput at the aggregate level; rather the tendency is toward the ever-greater use of energy and materials. This is captured by the well-known Jevons paradox, named after the nineteenth-century economist William Stanley Jevons. Jevons pointed out that gains in energy efficiency almost invariably increase the absolute amount of energy used, since such efficiency feeds economic expansion. Jevons highlighted how each new steam engine from Watt's famous engine on was more efficient in its use of coal than the one before, yet the introduction of each improved steam engine nonetheless resulted in a greater absolute use of coal.[23](#)

In reality the Jevons paradox as originally conceived is merely a restrictive application of the efficiency paradox of capitalism in general. Gains in labor productivity, for example, do not generally lead to less overall total labor time spent in production, since the object of all such gains is to promote further accumulation. As Marx remarked, the lessening of toil is "by no means the aim of the application of machinery under capitalism.... The machine is a means for producing surplus-value" and enhancing capital accumulation without end.[24](#)

Marx captured the expansive nature and logic of capitalism as a system in what he called "the general formula of capital," or M-C-M'. In a simple commodity economy, money exists merely as an intermediary to facilitate exchange between distinct commodities associated with definite use values, or C-M-C. The exchange begins with one use value and ends with another, with the consumption of the final commodity constituting the end of the process. Capitalism, however, takes the form of M-C-M', with money (M) being exchanged for labor and material means of production with which to produce a new commodity (C), to be exchanged for more money (M'), which realizes the original value plus added value, i.e., surplus value or profit ($M + \Delta m$). Here the process does not logically end with the receipt of M'. Rather the profit is reinvested so that it leads in the next phase to M-C-M'', and then to M-C-M''', in an unending sequence only interrupted by periodic economic crises. Capital in this conception is nothing but self-expanding value, and is indistinguishable from the drive to accumulate on an ever-increasing scale: "Accumulate, accumulate! That is Moses and the prophets!"[25](#)

This ceaseless drive for the amassing of greater and greater wealth, requiring more and more consumption of energy and resources, and generating more waste, constitutes "the absolute general law of environmental degradation under capitalism."[26](#) Today the scale of the human economy has become so large that its everyday activities, such as carbon dioxide emissions and freshwater use, now threaten the fundamental biogeochemical processes of the planet.

Ecological analysis points quite irrefutably to the fact that we are up against the earth's limits. Not only is continued exponential economic growth no longer possible for any length of time, but also it is necessary to *reduce* the ecological footprint of the world economy. And since there is no such thing as an absolute decoupling of the economy from ecological consumption this means the size of the world economy must also not increase; instead, it must decrease in size.[27](#) On top of this and reinforcing this dilemma, the world economy must wean itself entirely from fossil fuels as an energy source—before the one trillion metric ton (and hopefully before the 750 billionth metric ton) of carbon is emitted into the atmosphere. Yet without the subsidy of fossil fuels a continuation of world-capitalist-industrial economy in its present form will prove impossible.[28](#)

Monopoly Capital and a "Prosperous Way Down"

In order to understand why the ecological problem is so intractable for capitalism, and what this tells us about the necessary exit from our present planetary emergency, it is useful to look at a passage by *Monthly Review* editors Harry Magdoff and Paul Sweezy, written almost forty years ago, but well worth examining at length today:

Take...the deep-seated faith that increasing production and productivity are the sovereign

panacea for all the ills of capitalism.... It is clear that this myth has been severely shaken as we have become aware of growing shortages of raw materials and energy sources and of the increasingly severe impact of multifarious forms of pollution on the health and well-being of whole populations. Instead of a universal panacea, it turns out that growth is itself a cause of disease. But how is one to stop growth and yet keep capitalist enterprise afloat? In the absence of growth, for example, industries that produce machinery and other means of production would wither, since they would be confined to making only replacement equipment. Declining capital goods industries in turn would result in reduced employment and thus declining consumer demand, which in turn would end up in shutdowns of factories manufacturing consumer goods.

But this is only one side of the picture. Suppose we forget about trying to control growth and instead focus on abating the effects of growth by reducing pollution and arranging for a more rational use of raw materials and energy. Such an approach, it is clear, would entail a high degree of social planning: nothing less than a wholesale redirection of the economy involving, among other things, changes in population distribution, methods of transportation, and plant locations—none of which can be subjected to real social planning without violating the rights of private property in land, factories, stocks and bonds, etc.

From whichever side the problem is approached—controlling growth or restructuring existing production, transportation, and residential patterns—we come up against antagonisms and conflicts of interest that capitalists and those charged with protecting capitalist society cannot, in the very nature of the case, face up to. In the final analysis, what stands in the way of any effective action is the contradiction between the social potential of present-day technology and the antisocial results of private ownership of the means of production.[29](#)

Despite the fact that the environmental problems are immeasurably worse than when the above was written, this analysis has lost none of its relevance. It is even more evident that growth, rather than being “a universal panacea,” is “a cause of disease.” Today “what is essential for success is a reversal, not a mere slowing down, of the underlying trends of the last few centuries.”[30](#) Nevertheless, where capitalism is concerned, expansion is a requirement for the existence of the system itself. “Capitalism,” as Murray Bookchin observed, “can no more be ‘persuaded’ to limit growth than a human being can be ‘persuaded’ to stop breathing. Attempts to ‘green’ capitalism, to make it ‘ecological,’ are doomed by the very nature of the system as a system of endless growth.”[31](#)

Matters are equally intractable on the other side of the picture, as portrayed by Magdoff and Sweezy. Capitalism’s inability to engage in social and economic planning is reflected in decades of failed environmental policy. Although there have been some relatively minor environmental improvements, all attempts at comprehensive planning and action of the kind needed to avert what the scientific community is pointing to as a sure path of destruction have been systematically repulsed by the system. Instead technological change is invoked as a *deus ex machina*, allowing us to proceed along the current path of production, distribution, and consumption. There is no doubt that the social-technological potential already exists to address our most chronic environmental problems and to improve human existence—if we were to use present human capacities and natural resources in a rational and planned way. Yet, this existing potential is simply discarded: as all such rational solutions necessarily cross swords with the “antisocial [and anti-ecological] results of private ownership of the means of production.”

Here it is essential to recognize that capitalism in its monopoly stage is a system with such a high level of labor productivity that it is constantly prone to overaccumulation of capital and stagnation due to market saturation and scarcity of profitable outlets for productive investment. In order to continue to exist and to continue to reap monopolistic profit margins under these conditions it has mutated into an economy of built-in waste: both economic and ecological. Ours is a society characterized by (1) a gargantuan and ever-expanding sales effort penetrating into the structure of production itself; (2) planned obsolescence (including planned

psychological obsolescence); (3) production of luxury goods for an opulent minority; (4) prodigious military and penal-state spending; and (5) the growth of a whole speculative superstructure in the form of finance, insurance, and real estate markets. It is a characteristic of such a system that much of the vast economic surplus of modern society shows up as economic waste built into production itself. All of this uses up enormous amounts of energy and resources and contributes to the ecological end-waste dumped on the planet. It also maximizes the toxicity of production, since plastics and other petrochemical-based goods are more toxic as well as cheaper economically.³² It is for this reason that leading systems ecologist Howard Odum, in a paper on Marx, insisted that the key to addressing our environmental problem—the way to find what he elsewhere called “a prosperous way down”—necessarily involves eliminating built-in “luxury and waste.”³³

Among the early theorists of monopoly capitalism at the beginning of the twentieth century, it was the iconoclastic U.S. economist and sociologist Thorstein Veblen who most powerfully argued that a system dominated by giant corporations, prone to overproduction and overcapacity associated with its monopolistic pricing policy, was inherently characterized by the proliferation of economic waste.³⁴ The result was the undermining of the use value structure of production, leading to a squandering of natural resources and human labor, a growing gap between the actual and potential production, and a failure to fulfill genuine social needs. Under monopoly capitalism (characterized by what economists call “monopolistic competition”), “The producers,” Veblen wrote,

have been giving continually more attention to the saleability of their product, so that much of what appears on the books as production-cost should properly be charged to the production of saleable appearances. The distinction between workmanship and salesmanship has progressively blurred in this way, until it will doubtless hold true now that the shop-cost of many articles produced for the market is mainly chargeable to the production of saleable appearances....

It is presumably safe to say that the containers account for one-half the shop-cost of what are properly called “package goods,” and for something approaching one-half of the price paid by the consumer. In certain lines, doubtless, as, e.g., in cosmetics and household remedies, this proportion is exceeded by a very substantial margin.³⁵

Veblen’s argument on the proliferation of economic waste in the world of the giant corporation had an enormous influence on freethinking, political-economic critics in the United States and elsewhere for much of the twentieth century, including figures such as Scott Nearing, K. William Kapp, Vance Packard, and John Kenneth Galbraith.³⁶

However, it was the Marxian political economists Paul Baran and Paul Sweezy in their work *Monopoly Capital* who were to take Veblen’s insight the furthest. The sales effort that characterized monopoly capitalism, they argued, went far beyond mere advertising and sales promotion. Rather what had emerged was “a condition in which the sales and production efforts interpenetrate to such an extent as to become virtually indistinguishable,” signaling “a profound change in what constitutes socially necessary costs of production as well as in the nature of the social product itself.” Baran and Sweezy referred to this phenomenon in their correspondence as “the interpenetration effect.” They illustrated this by referring to an influential economic study that had been carried out in regard to changes in car models. Estimating the direct yearly costs of car model changes in the 1950s, most of which were related simply to appearance or to the “horsepower race,” the study’s authors demonstrated that such costs were “staggeringly high,” amounting to over 25 percent of the total costs of the cars sold. And none of this included the costs of car model changes that were expended over the life of the vehicles, such as planned obsolescence, higher repair costs, and increased gasoline consumption. Nor did it question the enormous monopolistic profits of automobile manufacturing corporations or the huge dealers’ markups, running at 30 to 40 percent.³⁷

The theory of monopoly capital thus suggests that the economic waste of capitalist society is

not found just on the surface of society, as evident in military spending, advertising, speculation, and the like, but rather the irrationality extends into production itself in ways that are rarely analyzed even by radical social and environmental critics of the system. It is generally assumed today that any good produced is manufactured under optimum conditions and is aimed at the satisfaction of consumer sovereignty. But nothing could be further from the truth in either case. The bulk of production and of the labor that makes it in today's U.S. economy constitutes economic waste in Veblen's sense of "expenditure" that "does not serve human life or human well-being as a whole" and belongs to the category of unproductive labor.³⁸ As Baran and Sweezy put it: "The designer of a new model of a consumer durable good, the engineer retooling the factory for the production of that model, the blue-collar worker affixing chrome to the automobile or compounding a new 'edition' of a toothpaste, the printer manufacturing a fancy new wrapper for an old soap, and the construction worker helping to build a new corporate 'crystal palace' are all members of the huge sales army which is supported by a considerable part of society's output."³⁹

In other words, much of the labor in modern production is unproductive, in the sense of not contributing to but rather paid out of society's economic surplus. This development also represents the destruction of the use value structure of the capitalist economy, which is no longer dominated by social use values, C, but increasingly by specifically capitalist use values, CK, having as their sole purpose the promotion of exchange value. The problem of M-C-M' is then transformed by the introduction of such specifically capitalist use values into one of M-CK-M'. The quantitative advancement of exchange value, and hence economic growth as measured in our society, can no longer be assumed to constitute an advancement of human welfare in aggregate, but more likely constitutes the opposite.⁴⁰ It progressively becomes the chief source of today's ultimate crisis.⁴¹

In his 1960 book *The Waste Makers*, Packard quoted leading industrial designer Brooks Stevens who said, "our whole economy is based on planned obsolescence" and yet who denied that this constituted a system of "organized waste," on the questionable grounds that it contributed positively to economic growth.⁴²

We live in a world not of increasing real wealth but rather of "illth" to use John Ruskin's memorable term.⁴³ In their pioneering Index of Sustainable Economic Welfare in *For the Common Good* (1994), Herman Daly and John Cobb provided an analysis of total economic welfare, incorporating ecological costs in addition to traditional income data, and demonstrated that per capita sustainable economic welfare was in decline, beginning in the 1980s, even while GDP was on the rise.⁴⁴ However, this attempt at a more accurate reckoning of changes in material welfare—since it did not scrutinize production itself—however only scratched the surface of the irrationalities built into the laws of motion of contemporary monopoly-finance capital and its increasingly destructive relation to the environment.⁴⁵

Today the evermore wasteful nature of capitalist production, viewed from a qualitative or use-value perspective, is starkly evident. The packaging industry, much of which is devoted to marketing wares, is the third largest industry in the world after food and energy.⁴⁶ It has been estimated that packaging costs an average of 10–40 percent of non-food produce items purchased. The packaging of cosmetics sometimes costs three times as much to produce as the actual contents within it.⁴⁷ Around 300 million tons of plastic are produced globally each year. Only two-thirds of this is enough, according to the *Guardian*, "to cover the 48 contiguous states of the U.S. in plastic food wrapping." Advertising for some products, such as soap or beer, is 10–12 percent of the retail cost per unit sold, while with some toys advertising is 15 percent of the retail cost.⁴⁸ The sales promotion budgets of corporations meanwhile are often three times that of their advertising budgets.⁴⁹ More than a trillion dollars was spent on marketing in the United States in 2005 alone.⁵⁰

There is no obvious way of estimating the full cost of the irrational structure of production under such a system; nevertheless, it is clear that it is of vast dimensions, and the material cost of goods is generally far exceeded by their marketing and distribution costs. It follows that

social and ecological planning geared to the production of use values and not the artificial promotion of exchange value could promote genuine human needs at a sharply reduced ecological cost. This is doubly and triply the case if we recognize the possibility of social planning of transportation, urban structure, population densities, etc.

Mainstream environmental critics often attribute the increasingly wasteful and destructive forms of consumption that blight our society to the failings of the ordinary consumer under the assumption of “consumer sovereignty,” one of the principal tenets of orthodox economics. But with one out of every twelve dollars of U.S. GDP spent on marketing (which does not include the marketing costs built into the production of the commodities themselves) consumer sovereignty is a mere illusion. Individuals in society are subject to relentless marketing propaganda nearly every moment of their waking lives. Indeed, as John Kenneth Galbraith argued through his famous “dependence effect,” the way we consume in today’s capitalism is largely dependent on the way we produce, and not the other way around.[51](#)

Marketing commodities in ways that exploit the alienation of human beings in monopoly capitalist society is now a fine art. As early as 1933, sociologist Robert S. Lynd observed in a monograph entitled, “The People as Consumers,” written for the President’s Research Committee on Social Trends, that “advertising, branding, and style” changes were designed to take full advantage of the social insecurity and alienation brought on by changing economic conditions. Corporations looked on “job insecurity, monotony, loneliness, failure to marry, and other situations of tension” as opportunities for elevating “more and more commodities to the class of personality buffers. At each exposed point the alert merchandiser is ready with a panacea.”[52](#) The symbolic need that commodities thus attain in our society is crucial to what Juliet Schor has called “the materiality paradox,” i.e., the selling of material goods to satisfy needs that cannot in fact be met by material commodities.[53](#) Ironically, it is this inability to obtain satisfaction from these commodities that ensures capital a permanent market—as long as, we are constantly told, “satisfaction is guaranteed.” Marketing plays on these social vulnerabilities, creating an endless series of new wants, enhancing the overall wastefulness of the system.

Monopoly capitalism demands an ever-faster circulation of commodities in order to increase sales. Durability is the enemy of the system. Maximum profits are thus generated by a throwaway culture. The economic life of cell phones in the United States is only a couple of years due to both planned and psychological obsolescence, with the result that 140 million cell phones reached what the Environmental Protection Agency refers to as their “end of life” (EOL) in 2007. Some 250 million computers and peripherals reached their EOL in the same year.[54](#) In 2006 Steve Jobs urged customers to buy an iPod every year to keep up with the latest technology.[55](#) More than 150 billion single-use beverage containers are purchased in the United States every year, while 320 million take-out cups are bought and discarded *each day*. Since the 1960s, one-time-use containers have risen from 6 percent of packaged soft drinks to 99 percent today. The more than 100 billion pieces of mostly unwanted junk mail delivered to homes and businesses in the United States each year add 51 million tons of greenhouse gases annually.[56](#) In an economy designed to maximize overall waste, products are systematically made so as to no longer be repairable. Consumers are therefore compelled to discard them and return to the market and buy them again.

The macro-inefficiency of the system, the lack of anything resembling social and economic planning, and the prodigious mountains of waste, are omnipresent realities wherever we turn—though, like the proverbial fish in the water, we are often unable to see it. The structure of cities organized around a “car-first” transportation system, the proliferation of strip malls, urban traffic congestion, the casino economy, the litigious society, the war economy, the penal state, and the lavish, conspicuous consumption of the 1 percent—all point to a world of extreme excess, accompanied by tremendous social deprivation and environmental degradation. It is estimated that the average U.S. traveler aged eighteen or older spends 18.5 hours a week in a car. In the 1980s U.S. licensed drivers drove an average of about 10,000 miles a year; today it is around 14,000. Americans drove three trillion miles in 2010. In 2010, the average weight of a U.S.

vehicle was almost 800 pounds heavier than in 1987. For each million cars in the United States, asphalt paving equaling nearly 200,000 football fields is required.[57](#)

A number of studies have shown that the economic surplus in the United States—much of which finds its statistical trace in economic waste associated with advertising, military spending, and other forms of socially unproductive output—constitutes more than 50 percent of GDP.[58](#) To this should be added the unnecessary costs associated with “the interpenetration effect.” None of this, moreover, takes into account the actual harm inflicted on human beings and the environment—so-called “negative externalities.” Indeed, capitalism, as the environmental economist K. William Kapp once argued, is “an economy of unpaid costs.”[59](#)

What all of this means is that most of the economy is directed at anything but the needs of the vast majority of the human beings who work and generate output. “For all its stinginess,” Marx wrote, “capitalist production is thoroughly wasteful with human material, just as... [it is] very wasteful of material resources, so that it loses for society what it gains for the individual capitalist.”[60](#) The result under today’s monopoly-finance capital is that by any rational standards the material progress at present is becoming more negative all the time. As Barry Commoner and Charles Anderson pointed out as early as the 1970s, we are overshooting nature’s capacity to sustain our economic activities and thereby generating an enormous “ecological debt” that must eventually be paid merely for our continued survival.[61](#)

Odum, who spent the last two decades of his life perfecting a devastating ecological critique of neoclassical economics in which he repeatedly emphasized the overlap between his views and Marx, provided perhaps the clearest and most comprehensive analysis of what needs to be done in the face of the planetary crisis. He argued that it was possible to find a social resolution to conditions of climax accumulation represented by ecological overshoot by altering the structure of production and consumption on a global scale and reorienting the economic system to real wealth. This meant recognizing that “a principal waste in our society is using fuels in nonproductive activity. We drive more cars than necessary, drive them too often, and drive cars with too much horsepower. We use cars for commuting because cities are not organized with alternative transportation. Because higher costs of energy do cause people to eliminate some stupid wastes, higher fuel taxes may be needed in the United States for these wasteful uses.”

Crucial to the development of sustainable economic conditions, Odum insisted, was the elimination of unequal ecological exchange. He demonstrated that in the late 1990s the United States was gaining 2.5 times more real wealth (i.e., embodied energy) than it exported, mainly to the disadvantage of underdeveloped countries. Needed social change also required “controlling global capitalism’s inherent tendency for short-term exploitation of resources,” which could undermine the national/international “resource basis... causing collapse.” Capitalist growth was “identified,” in his conception, “as a large-scale analog of weed overgrowth.” Globally, “the exclusive dominance of large-scale capitalism” should be “replaced with an emphasis on cooperation with the environment and among nations.”[62](#)

In order to transcend what he called a “cancerous capitalism” that overdrafted resources and energy, Odum insisted that it would be essential to eliminate the economic and ecological “waste and luxury” that did not support jobs, real productivity, and real wealth. Hence, it would be necessary, among other things, he suggested, to: (1) change industry from a focus on “construction” (i.e., net investment) to “maintenance” (i.e., replacement investment); (2) “place an upper limit on individual incomes”; (3) reduce “unearned income from interest and dividends”; (4) “downsize by reducing [upper-level] salaries rather than discharging employees”; (5) “provide public work programs for the unemployed”; (6) “decentralize organizational hierarchy”; (7) “limit the power of private cars”; (8) eliminate “plastic discard packaging”; (9) prioritize “ecological net production over consumption”; (10) promote an optimal economy through “high diversity, efficient cooperation”; (11) “share information without profit”; (12) promote “equity between nations” in ecological exchange; and (13) “use agricultural varieties that need less input.” Odum was clear that this transition required a break with “imperial capitalism.”[63](#) “Socialistic ideals

about distribution,” he observed, “are more consistent with [a] steady state than growth,” while for capitalism it was exactly the opposite.[64](#)

The Global South and the Ultimate Crisis

Ecological footprint analysis tells us that the world is in overshoot, currently using resources at a rate that would be sustainable for one and a half planet Earths. The main source of this environmental overdraft is to be found in the excesses of the rich countries, which are now, however, being duplicated throughout the globe. Indeed, if the whole world were to have the ecological footprint per capita of the United States, five Earths would be needed.[65](#) The very size of the ecological footprint of a rich economy such as the United States is an indication of its heavy reliance on unequal ecological exchange, extracting resources from the rest of the globe, particularly underdeveloped countries, in order to enhance its own growth and power.

Odum was able to demonstrate concretely that while the United States received more than twice as much embodied energy from trade as it exported, Ecuador was exporting five times the embodied energy that it received. Trade between the two was thus enormously disadvantageous to Ecuador in real wealth terms, while providing a massive ecological benefit to the U.S. economy.[66](#)

It follows that the downsizing of ecological footprints to get the world back in accord with environmental limits must necessarily fall very disproportionately on the rich capitalist countries. The only just and sustainable solution is one of contraction and convergence, whereby global per capita carbon emissions and ecological footprints are equalized, along with the elimination of unequal ecological exchange.[67](#)

The global South is in many ways more immediately imperiled than the North by climate change and by the other planetary rifts. It is here too that an international peasant movement, La Vía Campesina, has emerged, and with it hopes of the development of an environmental proletariat.[68](#) Meanwhile the propaganda machine of the rich capitalist countries portrays emerging economies (notably China, where carbon emissions now exceed those of the United States) as constituting the single greatest threat to the environment. Understanding the relation of the global South to the ultimate crisis is therefore crucial.

Comparison of the economy-ecology nexus of underdeveloped countries with that of developed monopoly-capitalist economies only serves to highlight the waste-ridden character of the latter. High levels of energy and carbon (fossil-fuel) intensity have characterized the major industrial countries in the post-Second World War era.[69](#) This high-energy intensity was made possible by the imperial system of ecological (and economic) unequal exchange. Stripped of their vast imperial-ecological and fossil-fuel subsidies, the rich economies would be readily perceived as the inefficient systems they are.[70](#)

Simon Kuznets, often viewed as the foremost figure in the development of national income accounting in the United States, highlighted some of the contradictions in comparing the GDPs of developed and underdeveloped economies. In a 1949 article “National Income and Industrial Structure,” Kuznets argued that the rich capitalist countries were grossly overvalued in national income terms in comparison with less industrialized, less commercialized economic formations because everything that passed through the market—even costs that were mere “offsets” for the inefficiency and destructiveness of concentrated industrial-capitalist production—were seen as enhancing national income and economic growth.[71](#) Thus, it was well known (with specific reference to China) that “preindustrial” or underdeveloped economies were able to produce a higher nutritional content at lower cost; were more efficient “in respect to distance” in the bringing together of producers with consumers, and in not requiring the packaging and processing of produce to avoid spoliation; and were able to provide security to individuals over their life cycle through the organization of “family and community life” (which in the rich economies requires insurance).[72](#)

Much of what was counted as income and economic growth in modern industrial society such as “extra transportation and handling” thus could be “nettified” (or netted out) as mere offsets to the inefficiencies and destructiveness of concentrated industrial and urban life. Here Kuznets included unnecessary dependence on the automobile; much of the cost of housing; the enormous amounts spent on distribution, transportation, and communication; expenditures on banks, employment agencies, brokerage houses, etc.

A great deal of what was counted as GDP and as economic growth therefore consisted of nothing more than “libations of oil on the machinery of industrial society.” In highly industrialized economies “production, in the narrow sense of converting hides into shoes,” Kuznets observed, “accounts for merely a small part of the values of finished goods, whereas” in the underdeveloped economies “it accounts for practically all of it. The transportation and distribution activities in an industrial society can thus be clearly seen as offsets to the [real material] disadvantages of large-scale, machine manufacturing.”

For Kuznets, then, many of the additional costs incurred by advanced industrial societies were intermediate offsets to negative features associated with those societies, adding nothing to final use values. However, from a social-planning or socialist perspective, as in Baran and Sweezy’s analysis, the criticism went even deeper, since the bulk of these artificial social costs could be classified not just as offsets to urban-industrial life, but as products of the exploitative, profit-centered, and monopolistic character of the capitalist economy, and thus socially irrational in that sense as well.[73](#)

In today’s increasingly globalized monopoly-finance capital, the ecological, social, and economic irrationalities of the organization of production are visible on a planetary scale. This is particularly the case with agribusiness, given its heavy, almost exclusive, dependence on intensive carbon inputs at every stage of the production process (including fertilizer production); its destruction of subsistence farming; its vast food processing, packaging, and supermarket chains; and its global distributional and transportation networks that maximize food miles. According to the *New York Times*: “Cod caught off Norway is shipped to China to be turned into filets, then shipped back to Norway for sale.” This is due primarily to the global labor arbitrage, which takes advantage of low Chinese wages (based on migrant labor and thereby subsidized by peasant subsistence agriculture which covers the main reproduction costs of the workers). Likewise the global labor arbitrage explains why it is that “half of Europe’s peas are grown and packaged in Kenya.” One study looked at a typical Swedish breakfast of bread, butter, cheese, apple, coffee, cream, orange juice, and sugar, and concluded that the food had traveled the equivalent of 24,901 miles—the circumference of the planet.[74](#) The average food item in U.S. consumption now travels over 1,500 miles from field to table. Food miles associated with consumption in the United Kingdom amounted to “33 billion vehicle-kilometeres in 2002.”[75](#)

Again and again agribusiness has been shown to be less efficient in producing food per acre than intensive, small organic farming, which is also less damaging to the environment and is far superior in providing a livelihood for people and whole communities on the land.[76](#) Hence, La Vía Campesina claims that in order to provide food security, livelihoods, jobs, and human health, as well as to protect the environment, global food production has to be in the hands of small-scale sustainable farmers, as opposed to large, monopolistic agribusiness corporations and supermarket chains. “The moral of the tale,” Marx observed in the 1860s, “...is that the capitalist system runs counter to a rational agriculture, or that a rational agriculture is incompatible with the capitalist system...and needs either small farmers working for themselves or the control of the associated producers.”[77](#)

The world revolt of small-scale farmers increasingly places ecology at the forefront, as groups of rural workers organize to fight the logic of capital in order to establish social control over ecological-material relationships and forge more meaningful, less alienated, and more sustainable conditions for life. According to environmental sociologists Mindi Schneider and Philip McMichael in the *Journal of Peasant Studies*, “Marx’s concept of the ‘metabolic rift’ ...in

the context of an international peasant mobilization embracing the science of ecology...has become the focal point of attempts to restore forms of agriculture that are environmentally and socially sustainable.”[78](#)

Odum insisted that increasing constraints on fossil-fuel use would spell the end of today’s petrofarming system. “The high yields from industrial agriculture generated a very cruel illusion because the citizens, the teachers, and the leaders did not understand the energetics involved.... A whole generation of citizens thought that higher efficiencies in using the energy of the sun had arrived. This was a sad hoax, for people of the developed world no longer eat potatoes made from solar energy.... People are really eating potatoes made partly of oil.”[79](#)

Without the subsidy provided by the fossil fuels, today’s agribusiness system will simply collapse. As a result it will be necessary to return to more ecologically efficient forms of traditional agriculture. In this way, the knowledge system will be inverted. Rather than agribusiness corporations providing knowledge to traditional peasant farmers, it will be the latter who will be the inspiration for the most appropriate agriculture, rooted in thousands of years of cumulative knowledge of soil cultivation, supplemented by the advancements associated with modern agroecology. “Policies about population and development appropriate to low-energy restoration,” Odum wrote, “may be like those formerly found in low-energy cultures like the Yanomamo Indians of Venezuela.”[80](#)

The notion that the areas of the global South, including China and India, can easily incorporate the billions of people now engaged in small-scale agriculture into the overcrowded urban centers of the third world is the product of a development ideology according to which the rich countries of Western Europe are said to have rapidly absorbed their own rural populations within their emerging, industrialized cities. In reality there were huge waves of emigration of Europeans to the colonies taking the pressure off the cities. (In the United States, which was a receiving ground for much of this European emigration, urbanization occurred much more gradually. By 1900, nearly 80 percent of the British population lived in cities, while 40 percent of the U.S. population did. It took until 1960 before 70 percent of the U.S. population resided in cities, and until 2000 before it reached 80 percent.) Such an industrialization-urbanization pattern, relying on mass emigration, is clearly not feasible in today’s global South, which does not have the outlet of mass emigration on the scale now needed and the same carbon subsidies—given the constraints of climate change. Nor does it have the favorable economic conditions—expansion into a whole “new” continent (albeit leading to the genocidal conquest of the original inhabitants)—under which the United States emerged as a world industrial power. What is happening instead in many countries is the huge growth of urban slums as people migrate from the countryside into cities that contain insufficient employment opportunities. Around one-third of the world’s city dwellers now live in slums.[81](#)

In response to these realities a powerful New Rural Reconstruction Movement has emerged in China—associated in particular with the pioneering ecological thinking of Wen Tiejun—that rejects large-scale farming-agribusiness systems as a viable pattern of development in today’s circumstances. Instead agriculture is to be rooted in the village system of collective land rights (the product of the Chinese Revolution) and the utilization of traditional knowledge of some 240 million small household farmers—further informed by contemporary ecological science. This transformation of food production and socio-ecological relationships also involves expanding rural education, medical services, and infrastructure. This strategy is “committed to the Three Ps (the People’s Principles): people’s livelihood, people’s solidarity, and people’s cultural diversity.”[82](#)

The Society of Sustainable Human Development

“Labour,” Marx wrote, “is first of all, a process between man and nature, a process by which man, through his own actions, mediates, regulates and controls the metabolism between himself and nature.”[83](#) It is this central metabolic relation between human beings and the natural environment which is now being called into question by capitalism on a planetary scale

generating constant and ever-growing metabolic rifts.⁸⁴ Even as global monopoly-finance capital falls prey to an endless stagnation crisis due to its own internal contradictions, it is also crossing all ecological boundaries in its drive for endless accumulation, thus activating its external contradictions on the broadest, most planetary scale.⁸⁵

Economic growth under capitalism is inseparable from an increase, to quote Herman Daly, in “the metabolic flow of useful matter and energy from environmental sources, through the economic subsystem (production and consumption), and back to environmental sinks as waste.” The key to a sustainable society is thus the rational regulation of this “metabolic flow relative to natural cycles that regenerate the economy’s resource depletion and absorb its waste emissions, as well as providing countless other natural services.”⁸⁶ Recognizing these material constraints, and the fact that production was ultimately nothing but the relation between human beings and nature, Marx defined socialism as a society in which “socialized man, the associated producers, govern the human metabolism with nature in a rational way...accomplishing it with the least expenditure of energy and in conditions most worthy and appropriate for their human nature.”⁸⁷

We are a long way from the rational, social regulation of the human metabolism with nature envisioned by Marx in the nineteenth century. Today the rift in this metabolism is threatening the entire planet as a place of habitation for humanity and countless other species. The gravity of the problem that faces us in addressing both the current planetary emergency and the inordinately destructive social metabolism of capital should not be downplayed. In order to avoid catastrophic climate change it will be necessary, science tells us, to find a way to keep the fossil fuels in the ground. We need to stay well below a trillion metric tons of carbon emissions if we are to have a reasonable chance of avoiding irreversible and catastrophic climate change. Rapidly cutting fossil-fuel consumption, however, means removing the energy subsidy on which today’s system of global monopoly-finance capitalism critically relies, calling the whole system into question.⁸⁸ At the same time, it will be necessary to reverse the other planetary rifts, such as species extinction, the rupture of the nitrogen and phosphorus cycles, ocean acidification, the depletion or overuse of fresh water, the elimination of natural vegetative ground cover, and the degradation of the soil—in order to not close off the future. Here too we are forced to confront the nature of our social system.

The really inconvenient truth is that there is no possible way to accomplish any, much less all, of these things other than by breaking with the underlying logic of the accumulation of capital, M-C-M’—and today’s even deadlier M-CK-M’. What is required both for long-term human survival, and for the creation of a new condition of “plenitude,” is a smaller ecological footprint for the global economy, coupled with a system of comprehensive social, technological, and economic planning—one that is of, by, and for the people.⁸⁹ It means abandonment of the myth of absolute economic growth as the panacea for all of society’s ills, and the downshift to a sustainable, steady-state economy rooted in the development of human community rather than individual accumulation.⁹⁰

Nevertheless, the grim reality is that the balance of forces in the world today and the shortness of time leave no room for real optimism in this respect. As Minqi Li cogently observed in *The Rise of China and the Demise of the Capitalist World Economy*, barring a very rapid overthrow of capitalism of a kind that can scarcely be imagined today, the system will inevitably lead us into global catastrophe. Even if socialism triumphs in the second half of the century, “the task for future socialist governments will no longer be about preventing catastrophes but trying to survive them as they are taking place.”⁹¹ All that can be said with certainty is that the sooner the world supersedes capitalism the greater the chance for survival.

“It is impossible to think of anything at all concerning the elementary conditions of social metabolic reproduction,” István Mészáros has written, “which is not lethally threatened by the way in which capital relates to them—the only way in which it can” as a mere means to accumulation. Indeed, as early as 1971, at the opening of the modern environmental era, Mészáros declared,

[A] 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.⁹²

Ironically, it is in the very waste and destructiveness of what Odum called the “cancerous capitalism” of today that we are able to discover the *potential* for a more rational, just, and sustainable society. Looking at the explosive growth of finance, already visible in their time, together with “advertising, product differentiation, artificial obsolescence, model changes, and the other devices of the sales effort,” Baran and Sweezy observed: “The prodigious volume of resources absorbed in all these activities does in fact constitute necessary costs of capitalist production. What should be crystal clear is that an economic system in which *such* costs are socially necessary has long ceased to be a socially necessary economic system.”⁹³

Notes

1. [↵](#) John Bellamy Foster and Robert W. McChesney, *The Endless Crisis* (New York: Monthly Review Press, 2012).
2. [↵](#) Karl Marx and Frederick Engels, *The Communist Manifesto* (New York: Monthly Review Press, 1964), 2.
3. [↵](#) Robert Heilbroner, “Ecological Armageddon,” in Warren A. Johnson and John Hardesty, eds., *Economic Growth vs. the Environment* (Belmont, CA: Wadsworth Publishing Co., 1971), 36–45.
4. [↵](#) Susan Solomon, et al., “Irreversible Climate Change Due to Carbon Dioxide Emissions,” *Proceedings of the National Academy of Sciences* 106, no. 6 (February 10, 2009): 1704–9; Heidi Cullen, *The Weather of the Future* (New York: Harper, 2010), 261–71; James Hansen, “Tipping Point,” in Eva Fearn and Kent H. Redford, eds., *State of the Wild 2008* (Washington, D.C.: Island Press, 2008), 7–8.
5. [↵](#) James Hansen, “[Comments on Assertions of Pat Michaels at Grover Norquist’s ‘Wednesday’ Meeting](#),” September 5, 2012; <http://www.columbia.edu>.
6. [↵](#) Stefan Rahmstorf and Dim Coumou, “Increase of Extreme Events in a Warming World,” *Proceedings of the National Academy of Sciences* 108, no. 44 (November 1, 2012): 17905–9; John Carey “Global Warming: Faster Than Expected?,” *Scientific American* 307, no. 5 (November 2012): 54; James E. Hansen, “Climate Change is Here—And Worse Than We Thought,” *Washington Post*, August 3, 2012; Mark Fischetti, “Did Climate Change Cause Hurricane Sandy?” *Scientific American* blog, October 30, 2012, <http://blogs.scientificamerican.com>.
7. [↵](#) Myles Allen, et al., “The Exit Strategy,” [Nature Reports Climate Change](#), April 30, 2009, 56–58, and “Warming Caused by Cumulative Carbon Emissions Towards the Trillionth Tonne,” *Nature* 458 (April 20, 2009): 1163–66; Malte Meinshausen, et al., “Greenhouse-Gas Emission Targets for Limiting Global Warming to 2°C,” *Nature* 458 (April 30, 2009): 1158–62; TrillionthTonne.org; Catherine Brahic, “[Humanity’s Carbon Budget Set at One Trillion Tons](#),” *New Scientist*, April 29, 2009; Katherine Richardson, Will Steffen, and Diana Liberman, *Climate Change: Global Risks, Challenges, and Decisions* (Cambridge: Cambridge University Press, 2011), 212.

An increase in global average temperature of 2°C is equivalent to a carbon dioxide concentration in the atmosphere of 450 parts per million (ppm). This would be too much for long-term stabilization of the climate, which requires no more than 350 ppm. However, keeping below the trillionth metric ton in emission is regarded as a prior constraint, since it constitutes a point of no return in terms of the possibility for effective human action with regard to these processes. If carbon emissions could be stopped below a trillion metric

tons, it would be possible to get back down over time to 350 ppm. See <http://trillionthtonne.org/questions.html#5>, accessed October 23, 2012.

8. ↪ Climate Central, *Global Weirdness* (New York: Pantheon Books, 2012), 165–67.
9. ↪ See Mark Lynas, *Six Degrees* (Washington, DC: National Geographic, 2008).
10. ↪ “[Ending Its Summer Melt, Arctic Sea Ice Sets a New Low that Leads to Warnings](#),” *New York Times*, September 19, 2012, <http://nytimes.com>; “[Arctic Expert Predicts Final Collapse of Sea Ice Within Four Years](#),” *Guardian*, September 17, 2012, <http://guardian.co.uk>; Carey, “Global Warming: Faster Than Expected?”, 52.
11. ↪ See <http://trillionthtonne.org>, accessed September 7, 2012.
12. ↪ Nicholas Stern, *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007), 4–16, 95, 193, 220–34, 637–51; John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift* (New York: Monthly Review Press, 2010), 153–56.
13. ↪ Glen P. Peters, et al., “Rapid Growth in CO₂ Emissions After the 2008–2009 Global Financial Crisis,” *Nature Climate Change* 2 (January 2012): 2–3.
14. ↪ Richard York, “[Asymmetric Effects of Economic Growth and Decline on CO₂ Emissions](#),” *Nature Climate Change* (October 7, 2012), <http://nature.com>; “[Greenhouse Link to GDP Not Symmetric](#),” ABC Science, <http://abc.net.au>.
15. ↪ Pwc (Pricewaterhousecoopers), [Counting the Cost of Carbon: Low Carbon Economy Index 2011](#), <http://pwc.com>, 2–7.
16. ↪ Charles H. Anderson, *The Sociology of Survival* (Homewood, IL: Dorsey Press, 1976), 122–23; Herman E. Daly, “Moving from a Failed Growth Economy to a Steady-State Economy,” in Julien-François Gerber and Rolf Seppacher, eds., *Toward an Integrated Paradigm in Heterodox Economics* (New York: Palgrave Macmillan, 2012): 176–89.
17. ↪ Carbon Tracker Initiative, [Unburnable Carbon](#), 2, accessed October 24, 2012, <http://longfinance.net>.
18. ↪ Bill McKibben, “[Global Warming’s Terrifying New Math](#),” *Rolling Stone* (July 19, 2012): 55–60.
19. ↪ Johan Rockström, et al., “A Safe Operating Space for Humanity,” *Nature* 461, no. 24 (September 2009): 472–75.
20. ↪ President Barak Obama, “[Interview of the President by the CBC](#),” February 17, 2009, <http://whitehouse.gov>.
21. ↪ Ecological modernization (green-capitalist) theorist, Arthur Mol, remarks: “In a number of cases (regarding countries and/or specific industrial sectors and/or specific environmental issues) environmental reform can even result in an absolute decline in the use of natural resources and discharge of emissions, regardless of economic growth in financial or material terms (product output).” See Arthur P.J. Mol, “Ecological Modernization and the Global Economy,” *Global Environmental Politics* 2, no. 2 (May 2002): 93. Yet, recent empirical analysis shows that such “absolute decoupling” is nonexistent at the global level, that is, to the extent that a decoupling exists within nations, it is due to the shifting of production and environmental effects from one part of the globe (usually the more powerful part) to another (the weaker part). See Andrew Jorgenson and Brett Clark, “Are the Economy and the Environment Decoupling?: A Comparative International Study, 1960–2005,” *American Journal of Sociology* 118, no. 1 (July 2012): 1–44.
22. ↪ On how the entropy law constrains technological solutions to environmental problems see Nicholas Georgescu-Roegen, *Energy and Economic Myths* (New York: Pergamon, 1976), 12, 57.
23. ↪ On the Jevons paradox see Foster, Clark, and York, *The Ecological Rift*, 169–82; David Owen, *The Conundrum* (New York: Riverhead Books, 2011).
24. ↪ Karl Marx, *Capital*, vol. 1 (London: Penguin, 1976), 492.
25. ↪ Marx, *Capital*, vol. 1, 247–57, 742. For the relation of M-C-M’ to the economic contradictions of capitalism see Paul M. Sweezy, *Four Lectures on Marxism* (New York: Monthly Review Press, 1981), 26–45.
26. ↪ Foster, Clark, and York, *The Ecological Rift*, 207–11.
27. ↪ On the failure of absolute decoupling and even relative decoupling of the economy

from the environment see Tim Jackson, *Prosperity Without Growth* (London: Earthscan, 2011), 67–86.

28. ↪ Solar energy is abundant but is “inherently dilute.” A great deal of energy is thus necessary to convert it into concentrated form and hence the net energy return on energy investment (EROI) is small. See Howard T. Odum, *Environment, Power, and Society* (New York: Columbia University Press, 2007), 207–9; Howard T. Odum and Elisabeth C. Odum, *A Prosperous Way Down* (Boulder, CO: University Press of Colorado, 2001), 163–68. Nuclear energy presents serious dangers and does not constitute a feasible overall alternative to fossil fuels. See Kozo Mayumi and John Polimeni, “Uranium Reserve, Nuclear Fuel Cycle Delusion, CO2 Emissions from the Sea, and Electricity Supply: Reflections After the Fuel Meltdown of the Fukushima Nuclear Power Units,” *Ecological Economics* 73 (2012): 1–6.
29. ↪ Harry Magdoff and Paul M. Sweezy, “Notes on Watergate One Year Later,” *Monthly Review* 26, no. 1 (May 1974): 8–10.
30. ↪ Paul M. Sweezy, “Capitalism and the Environment,” *Monthly Review* 41, no. 2 (June 1989): 6.
31. ↪ Murray Bookchin, *Remaking Society* (Boston: South End Press, 1990), 93–94.
32. ↪ This was famously highlighted by Barry Commoner, *The Closing Circle* (New York: Knopf, 1971), 138–75.
33. ↪ Howard T. Odum and David Scienceman, “An Energy Systems View of Karl Marx’s Concepts of Production and Labor Power,” in *Emergy Synthesis 3* (Proceedings from the Third Biennial Emergy Conference, Gainesville, Florida Center for Economic Policy, 2005), 41; Odum and Odum, *A Prosperous Way Down*.
34. ↪ The argument in the following pages develops on an earlier analysis in John Bellamy Foster, “[The Ecology of Marxian Political Economy](#),” *Monthly Review* 63, no. 4 (September 2011): 1–16.
35. ↪ Thorstein Veblen, *Absentee Ownership and Business Enterprise in Modern Times* (New York: Augustus M. Kelley, 1964), 300–301.
36. ↪ See especially K. William Kapp, *Social Costs of Private Enterprise* (Cambridge, MA: Harvard University Press, 1950); Scott Nearing, *The Economics of the Power Age* (East Palatka, FL: World Events Committee, 1952); John Kenneth Galbraith, *The Affluent Society* (New York: New American Library, 1958); and Vance Packard, *The Waste Makers* (New York: Simon and Schuster, 1960).
37. ↪ See Paul A. Baran and Paul M. Sweezy, “The Last Letters,” *Monthly Review* 64, no. 3 (July–August 2012), 68, 73; Franklin M. Fisher, Zvi Griliches, and Carl Kaysen, “The Costs of Automobile Changes Since 1949,” *The Journal of Political Economy* 70, no. 5 (October 1962): 433–51; Baran and Sweezy, *Monopoly Capital*, 131–38.
38. ↪ Thorstein Veblen, *The Theory of the Leisure Class* (New York: New American Library, 1953), 78–80.
39. ↪ Paul A. Baran and Paul M. Sweezy, “[Some Theoretical Implications](#),” *Monthly Review* 64, no. 3 (July–August 2012), 57.
40. ↪ The issue of “specifically capitalist use value” was addressed in a commentary on Baran and Sweezy’s analysis by Henryk Slajfer, “Waste, Marxian Theory, and Monopoly Capital,” in John Bellamy Foster and Henryk Slajfer, eds., *The Faltering Economy* (New York: Monthly Review Press, 1984), 302–13. The concept was carried forward in John Bellamy Foster, *The Theory of Monopoly Capitalism* (New York: Monthly Review Press, 1986), 39–42. The explanation of this as a transformation of Marx’s general formula of capital under monopoly capitalism, in terms of the emergence of M-CK-M’, was first introduced in Foster, “The Ecology of Marxian Political Economy.” Unbeknownst to the author at that time, a similar reformulation of Marx’s general formula as M-W-M’ had been introduced a number of years before in Patrick Brantlinger and Richard Higgins, “Waste and Value: Thorstein Veblen and H.G. Wells,” *Criticism* 48, no. 4 (Fall 2006): 466. For how this concept of waste (unproductive labor) influenced Baran and Sweezy’s analysis see Paul A. Baran and Paul M. Sweezy, “[Some Theoretical Implications](#),” *Monthly Review* 64, no. 3 (July–August 2012): 45–58; John Bellamy Foster, “[A Missing Chapter of Monopoly Capital](#),” *Monthly Review* 64, no. 3 (July–August 2012): 17–21.

41. ↪ The case for Marx's theory of socialism as one of sustainable human development is made in Paul Burkett, "[Marx's Vision of Sustainable Human Development](#)," *Monthly Review* 57, no. 5 (October 2005): 34–62.
42. ↪ Vance Packard, *The Waste Makers* (New York: Simon and Schuster, 1960), 46.
43. ↪ John Ruskin, *Unto This Last* (Lincoln, NE: University of Nebraska Press, 1967), 73.
44. ↪ Herman E. Daly and John B. Cobb, Jr., *For the Common Good* (Boston: Beacon Press, 1994), 463.
45. ↪ See Frederik Berend Blauwhof, "Overcoming Accumulation," in *Ecological Economics* (forthcoming).
46. ↪ Captain Charles Moore, *Plastic Ocean* (New York: Penguin, 2011), 129.
47. ↪ Diana Wicks, "[Packaging Sales Goals and Strategies](#)," *Chron*, <http://smallbusiness.chron.com>, accessed October 16, 2012; "[Product Packaging Can Cost Three Times as Much as What's Inside](#)," *Daily Mail*, July 13, 2007, <http://dailymail.co.uk>.
48. ↪ "[Global Hunger for Plastic Packaging Leaves Waste Solution a Long Way Off](#)," *Guardian*, December 29, 2011, <http://guardian.co.uk>; Moore, *Plastic Ocean*, 41; Hannah Holleman, Inger L. Stole, John Bellamy Foster, and Robert W. McChesney, "[The Sales Effort and Monopoly Capital](#)," *Monthly Review* 60, no. 11 (April 2009): 6.
49. ↪ Kevin C. Clancy and Robert S. Shulman, "Marketing with Blinders On," *Across the Board* 30, no. 8 (October 1993): 33–38; and their *Marketing Myths That Are Killing Business* (New York: McGraw Hill, 1994), 140, 171–72, 221.
50. ↪ "[U.S. Marketing Spending Exceeded \\$1 Trillion in 2005](#)," *Metrics Business and Market Intelligence*, June 26, 2006, <http://metrics2.com>.
51. ↪ Galbraith, *The Affluent Society*, 121–28. The one in every twelve dollars figure for marketing is based on the Blackfriars 2005 marketing estimate, representing roughly that portion of GDP that year. See note 50. On the role of marketing in the maintenance of monopoly capital, see Michael Dawson, *The Consumer Trap* (Urbana: University of Illinois Press, 2005).
52. ↪ Robert S. Lynd, "The People as Consumers," in President's Research Committee on Social Trends, *Recent Social Trends in the United States*, vol. 2 (New York: McGraw Hill, 1933), 858, 867–88.
53. ↪ Juliet Schor, *Plenitude* (New York: Penguin, 2010), 40–41.
54. ↪ Schor, *Plenitude*, 38.
55. ↪ Marc Perton, "[Jobs: 'You Have to Buy a New iPod at Least Once a Year'](#)," May 26, 2006, <http://endgadget.com>.
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58. ↪ See Baran and Sweezy, *Monopoly Capital*, 389; Michael Kidron, *Capitalism and Theory* (London: Pluto Press, 1974), 53; Michael Dawson and John Bellamy Foster, "The Tendency of Surplus to Rise, 1963–1988," in John B. Davis, ed., *The Economic Surplus in the Advanced Economies* (Brookfield, VT: Edward Elgar, 1992): 63.
59. ↪ Kapp, *The Social Costs of Private Enterprise*, 231.
60. ↪ Karl Marx, *Capital*, vol. 3 (London: Penguin, 1981), 180.
61. ↪ To our knowledge the term "ecological debt" first appeared in Anderson, *The Sociology of Survival*, 143. The direct inspiration, however, was Commoner, who had employed the

- concept of “environmental debt.” See Commoner, *The Closing Circle*, 295; Odum and Odum, *A Prosperous Way Down*, 139, 173, 175, 179. Odum used the concept of “emergy,” which reduced all forms of energy to energy of one kind (measured in solar emjoules) as a means of analyzing embodied energy; Odum, *Environment, Power, and Society*, 278.
62. ↪ Odum and Odum, *A Prosperous Way Down*, 149.
 63. ↪ Odum and Odum, *A Prosperous Way Down*, 183; Odum, *Environment, Power, and Society*, 58, 276, 389–91.
 64. ↪ Howard T. Odum, “Energy, Ecology and Economics,” *Ambio* 2, no. 6 (1973): 222.
 65. ↪ Global Footprint Network, “[World Footprint](http://footprintnetwork.org),” <http://footprintnetwork.org>, accessed October 16, 2012; Robynne Boyd, “[One Footprint at a Time](http://blogs.scientificamerican.com),” *Scientific American*, July 14, 2011, <http://blogs.scientificamerican.com>.
 66. ↪ Howard T. Odum and J.E. Arding, *Emergy Analysis of Shrimp Mariculture in Ecuador* (Narrangansett, RI: Coastal Research Center, University of Rhode Island, 1991), 33–39.
 67. ↪ Tom Atthanasiou and Paul Baer, *Dead Heat* (New York: Seven Stories Press, 2002).
 68. ↪ Foster, Clark, and York, *The Ecological Rift*, 439–40.
 69. ↪ This was true of the Soviet Union as well, the analysis of which, however, does not concern us here. See John Bellamy Foster, *The Vulnerable Planet* (New York: Monthly Review Press, 1999), 96–101.
 70. ↪ Odum, *Environment, Power and Society*, 274.
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 72. ↪ *Ibid*, 212–14, 229.
 73. ↪ *Ibid*, 216–19, 227.
 74. ↪ “[Environmental Cost of Shipping Groceries Around the World](http://nytimes.com),” *New York Times*, April 26, 2008, <http://nytimes.com>; Sally Deneen, “[Food Miles](http://thedailygreen.com),” *The Daily Green*, <http://thedailygreen.com>, accessed October 16, 2012.
 75. ↪ Report Buyer, *The Food Miles Challenge* (2006), <http://reportbuyer.com>, 2; Daniel Imhoff, “Thinking Outside of the Box,” *Whole Earth* (Winter 2002): 12.
 76. ↪ See in particular Amory B. Lovins, L. Hunter Lovins, and Marty Bender, “Energy and Agriculture,” in Wes Jackson, Wendell Berry, and Bruce Coleman, eds., *Meeting the Expectations of the Land* (San Francisco: North Point Press, 1984), 68–69; Michael A. Altieri, “Agroecology, Small Farms, and Food Sovereignty,” David Pimentel, “Reducing Energy Inputs in the Agricultural Production System,” and Jules Pretty, “Can Ecological Agriculture Feed Nine Billion People,” in Fred Magdoff and Brian Tokar, eds., *Agriculture and Food in Crisis* (New York: Monthly Review Press, 2010).
 77. ↪ Marx, *Capital*, vol. 3, 216.
 78. ↪ Mindi Schneider and Philip McMichael, “Deepening and Repairing, the Metabolic Rift,” *Journal of Peasant Studies* 37, no. 3 (2010): 461.
 79. ↪ Odum, *Environment, Power, and Society*, 189–90.
 80. ↪ Odum and Odum, *A Prosperous Way Down*, 87. For a discussion of how Cuba has transformed food production, see Richard Levins, “How Cuba is Going Ecological,” *Capitalism, Nature, Socialism* 16, no. 3 (2005): 7–25; Sinan Koont, “[Food Security in Cuba](http://monthlyreview.org),” *Monthly Review* 55, no. 8 (2004): 11–20.
 81. ↪ Samir Amin, “[World Poverty, Pauperization and Capital Accumulation](http://monthlyreview.org),” *Monthly Review* 55, no. 5 (October 2003): 1–9; Prabhat Patnaik, “[The Myths of Capitalism](http://mrzine.monthlyreview.org),” *MRZine*, July 4, 2011, <http://mrzine.monthlyreview.org>; UK House of Commons, *A Century of Trends in UK Statistics Since 1900* (House of Commons Library Research Paper 99/111), December 21, 1999, <http://parliament.uk>, 13; U.S. Census Bureau, *Statistical Abstract of the United States, 2012*, Tables 28 and 29, <http://census.gov>, accessed October 30, 2012.
 82. ↪ Wen Tiejun, et. al., “[Ecological Civilization, Indigenous Culture, and Rural Reconstruction in China](http://monthlyreview.org),” *Monthly Review* 63, no. 9 (February 2012): 29–35; Wen Tiejun, “Deconstructing Modernization,” *Chinese Sociology and Anthropology* 49, no. 4 (Summer 2007): 10–25.
 83. ↪ Marx, *Capital*, vol. 1, 283.
 84. ↪ On the scale of today’s planetary rift see Foster, Clark, and York, *The Ecological Rift*.
 85. ↪ On the relation between capitalism’s internal economic contradictions and its external ecological ones see Kent A. Klitgaard and Lisi Krall, “Ecological Economics, Degrowth, and

Institutional Change,” *Ecological Economics* (forthcoming).

86. ↩ Herman E. Daly, “Further Commentary,” in Jackson, *Prosperity Without Growth*, 267–68.
87. ↩ Marx, *Capital*, vol. 3, 959.
88. ↩ Max Weber was quite likely the first major thinker to stress that modern industrial capitalism was predicated on a fossil-fuel-based environmental regime. See John Bellamy Foster and Hannah Holleman, “Weber and the Environment,” *American Journal of Sociology* 117, no. 6 (May 2012): 1636, 1646–50.
89. ↩ On the nature of planning for a socialism for the twenty-first century see Harry Magdoff and Fred Magdoff, “[Approaching Socialism](#),” *Monthly Review* 57, no. 3 (July-August 2005): 19–61.
90. ↩ On the important concept of plenitude see Schor, *Plenitude*, 4–7.
91. ↩ Minqi Li, *The Rise of China and the Demise of the Capitalist World-Economy* (New York: Monthly Review Press, 2008), 187.
92. ↩ István Mészáros, *Beyond Capital* (New York: Monthly Review Press, 1995), 174, 893–94.
93. ↩ Baran and Sweezy, *Monopoly Capital*, 141.