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Article

Heterodox Political Economy and the Degrowth Perspective

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Abstract: The transition to sustainability will be difficult. Environmental sustainability entails living within the Earth's limits, yet the majority of scientific studies indicate a condition of overshoot. For mainstream economists sustainability means perpetuating economic growth. Consequently, environmental and economic sustainability are incompatible in the present institutional context. This paper seeks to develop a new theory of sustainability based upon historical and institutional contexts, the role of economic crises, as well as focusing upon energy quality and meaningful work. Mainstream economics, which emphasizes market self-regulation and economic growth, is not a good vehicle for a theory of sustainability. Better insights are to be found in the literature of heterodox political economy and political ecology. Political ecology is based upon the theory of monopoly capital. Monopoly capitalism exhibits a tendency towards stagnation, because the economic surplus cannot be absorbed adequately in the absence of system-wide waste. The Monthly Review School continues this tradition in the context of the metabolic rift, while the Capitalism, Nature and Socialism School develops the idea of a second contradiction of capitalism. The Social Structure of Accumulation school pursues the idea of long swings of economic activity based upon institutional structures that aid or inhibit capital accumulation.

Keywords: heterodox political economy; political ecology; metabolic rift; monopoly capitalism; social structure of accumulation; second contradiction of capitalism; energy return on investment

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1. Introduction

The transition from our present society to one that is environmentally, economically, culturally and socially sustainable will be difficult. Environmental sustainability entails living within the planet's

biophysical limits and the vast majority of scientific studies, from measurements of atmospheric carbon, to estimates of biodiversity and remaining fossil petroleum, show the size of human economy exceeds the Earth's finite limits. If all land were divided equally, according to ecological footprint analysts, each of us would have 1.8 hectares of land to grow our subsistence and assimilate our wastes. On a world-wide basis, we each use 2.2 hectares, while developed nations, such as the United States, appropriate close to ten [1]. Not only does the world economy need to achieve a steady state, it needs to reduce its footprint in order to stay within the Earth's biophysical limits. However economic sustainability is seen by the public at large and the mainstream economics profession as a problem of sustaining capital accumulation. Historically, economic growth has been the vehicle that enabled other social goals, such as achieving and maintaining full employment, reducing poverty, expanding capabilities and increasing opportunities. The developed world, and especially the rich nations of North America, is currently witnessing the effects of slow economic growth. Although the recession ended officially in 2009, unemployment remains stubbornly and persistently high, hovering around the 8% mark in the United States and even higher in Europe. Poverty rates are both high and increasing. Moreover the State has lost its ability to stimulate growth by means of fiscal and monetary policies. Not only are austerity measures being debated at the national level, but state and local governments find themselves short of funds to maintain infrastructure, educate the youth and provide basic social services. Europe especially may be witnessing "peak debt," when the ability to borrow money easily to expand the economy faces severe political and economic limits. The United States in particular finds itself in a period of political impasse, much like the 1970s, when no single political party had the strength to implement its agenda, yet was sufficiently organized to keep their rival's programs from being put into operation. In short, the developed world is in a period of economic crisis.

Biophysical and degrowth economists need to take seriously the problems of unemployment and poverty if anyone is to listen to us. In an era where the primary demand of the electorate is "jobs, jobs, jobs," ignoring the need of people to find steady and meaningful work will make those concerned only with living within nature's limits appear callous just at the time when rapid action is needed to forestall the worst effects of anthropogenic climate change and peak oil. However, the current declines in economic growth rates are not the result of concerted efforts to address climate change and resource depletion. Rather, periodic declines in growth are characteristic of a market system and have been since the inception of capitalism. The world economy has experienced several "great depressions" (1870s, 1890s and 1930s) and a series of post-World War II recessions. Moreover, the percentage change in the growth of Gross Domestic Product has been slowing since the 1960s [2]. The final element of social sustainability is normally defined as maintaining the basic structures of society intact. One must question whether this is even possible, yet alone desirable, for the world's richest nations. The basic elements of fossil fuel dependency, a globalized and financialized economy, conspicuous consumption all leading to elevated and increasing carbon emissions cannot be maintained and must be reversed. The three elements are in contradiction for the world's wealthiest nations. Maintaining the social structure requires elevated levels of energy and materials consumption. Maintaining the economy necessitates the continuation of capital accumulation and economic growth. However, in order to achieve environmental sustainability, the human ecological footprint must shrink. These cannot occur at the same time, and nature is the ultimate arbiter. Environmental sustainability must take precedence in the long run, despite popular political appeal of attending to economic sustainability

first. Humanity needs to find (in the words of Howard and Elizabeth Odum) a prosperous way down. In order to do so, we must abandon not only the economic theories of growth, but also the institutional structures of the growth economy.

2. Elements of a New Theory of Sustainability

It is time to explore and establish a new economic theory, one that does not depend upon continued growth in order to meet the needs of human beings, while respecting and sustaining the myriad other species on the planet. It can neither be a theory that justifies the systematic degradation of the planet's fundamental biophysical systems in the name of efficiency, nor can it turn a blind eye to the persistent inequality and poverty of the present system in the name of environmental sustainability. Furthermore, it must be a theory that is consistent with the end of the age of fossil fuels and sensitive to understanding the many positive feedbacks that exist in the interaction of complex biophysical and economic systems, and it should seek to understand the difficult connection between physical and social systems. Heretofore, all economic theory was conceived on the upslope of the Hubbert Curve, where ultimately recoverable reserves of petroleum increased annually as discovery and production exceeded depletion and the absolute scarcity of energy was not a pressing question. Under these conditions, economic progress could occur and labor productivity made to increase, by substituting fuels with a high Energy Return on Investment (EROI) for those that had a low EROI. The industrial revolution occurred when coal, with its relatively high energy density and EROI, replaced wood. Coal itself was supplanted by oil and natural gas. While the industrial revolution was enabled by fossil fuels, the quantity and quality of fuel alone does not explain sufficiently the economic and social changes that occurred in this time period. The way work was organized, class and power relations and the geography of production and exchange also changed fundamentally during the industrial revolution. We are now facing an unprecedented era when the second half of the age of oil is approaching, replete with lower energy quality and availability and higher cost. In addition, the increase in the admissions of carbon dioxide and its equivalents threatens the very stability of the climate through mechanisms, such as sea level rise, increased storm frequency and intensity, glacial melt and biodiversity loss.

A new economic theory of sustainability must contain at least six basic elements. To begin with, a new economic theory must address the real world in, which we live. The economy cannot be treated solely as an abstract and isolated system of exchange, but as a system of production and exchange embedded in both a finite and non-growing biophysical system and in a social and institutional context. Such a theory must recognize the prevalence and persistence of monopoly or concentrated industry, in the economy. It cannot rely on "perfect competitive" markets that result in efficient allocation and equity as outcomes. Nor can such a theory dismiss the importance of economic concentration by arguing that all markets are somehow "contestable." A sustainable model cannot treat the planet's ability to support life as an externality that can be internalized by somehow finding the correct price for nature's assets and services. Secondly the evolution of societies must be placed in a historical context. This is not the first transition that economy and society have experienced. Human interaction with nature has changed significantly in the transition from hunters and gatherers to settled agriculturalists, to merchants and industrial producers. If we are to develop a method capable of understanding the changes that we are about to experience, then our theory must have an

understanding of prior transitions. Over the long course of human history, prior to the age of fossil fuels, society has exhibited three main interacting characteristics. Human activity depended upon, and was limited by, the appropriation of the solar flow as an energy source. In addition, the bulk of production was for direct use. The small energy surplus that could be extracted from solar flow produced only a small economic surplus. This small surplus was exchanged infrequently. What we know as the marketplace was not a part of daily life for most in the medieval era and before. Basic needs were satisfied by means of production for use and reciprocity, while market activity was sporadic and often associated with feasts and festivals [3]. The world population, given these social and biophysical limits, was small and stable, and did not reach one billion until the beginning of the industrial era [4].

A few hundred years ago, at the dawn of the industrial era, all of these characteristics changed rapidly. Humans harnessed the power of fossil fuels in the 18th century. Industrial capitalism emerged, now based on the production for exchange and a money economy, began to expand exponentially in terms of production and population. It is my contention that in order to achieve sustainability, all of these characteristics—energy, population and the nature of exchange—must be addressed. We cannot continue business-as-usual and achieve sustainability by just "fixing" one of these elements. We simply cannot expect innovation, technological change, increases in efficiency and relative decoupling of GDP from material production to lead us to the requisite degrowth in order to live well within nature's limits. Nor can we expect "smart growth" to overcome the overshoot of the planet's limits. We must address the institutional context in which human activity occurs. We cannot rely on marginal changes in one element and go on "sustaining" the others: Producing and consuming as we do now, simply with new technologies. Unfortunately, mainstream economic theory does not differentiate between value and use value. They were distinct concepts in the era of classical political economy, but are easily confused by many economists, even in the degrowth movement. We need to make the distinction clear one again by understanding the historical context and social and institutional frameworks in which economic activity occurs and technological change evolves.

We as sustainability economists much also address the issues of economic crisis. Long before humanity reached the long-run sustainability threshold of 350 parts per million volume of atmospheric carbon and long before the depletion of high EROI hydrocarbons, capitalism suffered from both periodic downturns (recessions and depressions) and long periods of slow growth or decline (secular stagnation or, perhaps, long waves with an undertone of stagnation). We must understand the internal forces that create depression and stagnation, and we must understand how the advent of biophysical limits will affect the traditional internal limits to growth. Furthermore, we need to realize that the world has changed significantly since the last great depression. The world economy is more globalized and financialized. Sustainability economics needs to understand the different dimensions and pressures that the rise of global finance puts upon the growth process and, more importantly, to understand how the limits to growth, such as peak oil and climate change, will affect the financial economy, as well as the real economy.

Fourth, sustainability theory should focus upon the quality of work, not simply its presence or absence. A sustainable society must be based upon meaningful work. Meaningful work includes control over the pace and the quality of the work on the part of the worker, pride in the outcome of the product and the unity of head, hand and heart. Meaningful work should be spiritually uplifting and

convey the sense of doing something good for community and society. It should include both brain work and manual work and a sense of responsibility for passing the skills on to the next generation. Such work is not impossible to find, even in today's society. However, it is limited to small number of professional workers, for example skilled craftworkers, health professionals and college professors. While work should be steady and provide a living wage, meaningful work entails more than toiling at a job one does not like simply to earn a paycheck. In a steady-state economy, ever-expanding consumption simply cannot be the means by which people seek fulfillment. A return to craft pride and fulfillment in the process of production could be a more than adequate replacement in a society that does not grow.

Like economic theories that have come before, a theory of sustainability needs to address the question of labor productivity. However, increasing labor productivity should not be an end in-and-of-itself. Rising labor productivity in the absence of output growth manifests itself as rising unemployment and excess capacity. Moreover, much of the productivity growth in the 20th century can be attributed to the increase in cheap energy inputs [5]. As the world's oil supply peaks, the option of increasing energy to improve productivity may well dissipate. Moreover we need to explore historically the connection between increasing productivity and the degradation of work. The long postwar expansion was built on the institutional structure of productivity increases being translated into wage gains. This is no longer the case, as conditions in the world economy have changed dramatically. In a world that is decidedly less global and no longer growing, what will be the role of productivity increases? Will the future be one of long hours and hard manual labor as liquid fuels and electricity become vestiges of the past [6] or one of Plenitude, as rising productivity by means of technological change is spread out among vast segments of the working class to yield a society rich in culture and community, with fewer hours of paid employment and more leisure time [7]?

Fifth, a theory of sustainability must have a realistic vision of the role that energy plays in economic activity, including the growth of productivity. Charles Hall and I have attempted just such a synthesis in Energy and the Wealth of Nations [8], but more research needs to be conducted about the interactions of energy quality, technological change, the labor process, the global financial economy and the evolution of human society. Energy should be viewed from the perspective of impending absolute scarcity, the Energy Return on Investment (EROI) and from the perspective of the consequences of its use, especially as regards climate change. In addition, a theory of sustainability must be a transdisciplinary effort of those who understand biophysical limits, the workings of the economy and political processes. The difficult transition will occur in domestic and international political contexts. The political processes cannot be assumed away if we are to actually make the transition to sustainability.

Finally, a theory of sustainability must enunciate clearly a vision of the future that presents enough opportunity to the next generation, to those in the poor world and to those in the working and poor classes of rich nations to be supported by the aforementioned economic and political processes.

3. Prior Efforts of Heterodox Political Economy

For myriad reasons, from its emphasis on growth, price competition and rational acquisitive individuals meeting their needs by the expansion of material consumption, I believe that orthodox

neoclassical economics (and its many variants, such as new classical economics, supply-side economics, new welfare economics, *etc.*) is not the proper foundation for an economic theory of sustainability. Fortunately, a broad literature, known as heterodox political economy, exists that focuses upon many of the elements of a viable theory of sustainability. I cannot, in this brief essay, cover all the sub-disciplines of heterodox theory. Rather I will focus on two, Political Ecology and the Social Structure of Accumulation Approach, although many great and untapped insights can be found in the institutionalism of Thorstein Veblen, post-Keynesianism and the work of Piero Sraffa. While these approaches do not cover fully all of the elements enunciated in the section above, each has approached the study of the economy historically and has embedded the economy in an institutional context. Both modes of thought are compatible with analyses of climate change and resource shortage, and both emphasize the roles of work and finance in shaping the economy, although one (Political Ecology) addresses questions of sustainability directly, while the other (Social Structure of Accumulation) does not. The purpose of this essay is to survey briefly the elements of each theory, integrate them where possible and show how they can serve as a superior basis for a theory of sustainability.

Political Ecology, as practiced in developed nations, has two essential variants. The first is associated with the Monthly Review School. It builds upon the work on monopoly capitalism advanced in the 1960s through the 1980s by scholars, such as Paul Baran, Paul Sweezy, Harry Magdoff and Harry Braverman. It is predicated on the idea that capitalist production creates a metabolic rift in the relation between humans and nature and that the modern economy is subject to long-term stagnation. One could not pursue strategies of degrowth and the steady-state, while leaving the institutional arrangements of monopoly capitalism in place without creating a human disaster of unemployment and poverty. A second school of Political Ecology has arisen around the journal Capitalism, Nature and Socialism (CNS) and is associated with the work of James O'Connor. The CNS analyses are organized around the idea of a "second contradiction" between not only the forces and relations of production (as in Marx), but also between the forces and relations and the conditions of production, such as external physical conditions of the environment. If, as James O'Connor asks, growth and capital accumulation are essential for the market system, "is capitalism sustainable?" Both schools of Political Ecology make explicit connections between environmental degradation, the dynamics of capital accumulation, working conditions, the rise of finance, government policy and the global economy.

Another approach of heterodox political economy, that of the Social Structure of Accumulation (or SSA), makes valuable contributions to the historical evolution of economic institutions, the nature of the labor process, political policy and the state of macroeconomic activity. In 1982, SSA theory evolved from an analysis of segmented labor markets and expanded to explain historically the structural transformations experienced by the United States and attempted to answer the question of why the working class was so divided and lacking an independent political agenda. SSA theory evolved in the passage from the 20th century to the twenty-first, expanding beyond its roots in the study of the labor process into topics, such as globalization, the rise of neoliberalism and financial crises. There is a small literature emphasizing energy and the environment within the SSA framework.

While substantial differences exist in these perspectives, all offer important insights. By conceptualizing the economy as a complex system, grounded in production, as well as exchange, full

of contradictions and conflicts and incorporating political impasse, the heterodox political economy offers a far superior framework than does neoclassical economics with its isolated, acquisitive, rational and all-knowing consumer confronting equally powerless firms in isolated markets where conflicts of the real world, such as inadequate incomes, excess capacity, recessions, unemployment and poverty, never occur. I have critiqued neoclassical economics many times before, and the purpose of this essay is not to extend the critique further. Instead I argue that the frameworks of heterodox political economy allow for the assimilation of subject matters that were not included originally in their analyses, for example, energy or the interaction of climate change and financial markets or resource scarcities and the future of globalization, to a far greater degree than do orthodox economic theories. This essay now turns to a brief summary of Political Ecology and the Social Structure of Accumulation School. It will conclude with possible research directions and the enunciation of a sustainable set of goals that are compatible with the principles found in heterodox political economy.

4. Political Ecology

Political Ecology begins with the work of Karl Marx, but his knowledge of and concern about, the environmental consequences of economic growth and development is still a matter of debate. Marx saw capitalism as a system of self-expanding value. Historically, it was the first system in which the economic surplus would, by necessity, be reinvested back into the process of production. A capitalist who did not innovate with lower cost production and greater profits to reinvest would soon be driven out of business. A non-growing capitalism is not possible from the Marxian perspective, as capital is not just a thing, for example a machine or pool of money, but also a process of self-expanding value. Capitalism is generalized commodity production, where not only everyday goods and services, but also capital and the ability to work (labor power) are commodities that possess both use value and exchange value, even though the ability to work (labor power) may be produced (or reproduced) under non-capitalist conditions. Profits are generated in the process of production and are derived from the difference in the value workers can produce and the cost of their reproduction, on a daily and generational basis. Capitalists do not own the workers, but purchase their ability to work for a specific amount of time. The goal of a capitalist at the point of production is to transform labor power (a potential) into labor (a use value) whose value is embodied, along with the inputs from nature, in the cost of the good. Marx called the difference between the value of the commodity (set in terms of hours of socially necessary abstract labor) and the value of labor power (the cost of reproducing the worker) surplus value. Surplus value forms the basis of profit. The more labor that could be extracted from labor power, the greater the potential profit, and Marx spends several chapters in Volume I of Capital explaining how surplus value can be increased and how the process of capitalist competition necessitates an increase in the rate of surplus value and a reinvestment of the profits. Surplus value can be increased absolutely by lengthening the working day or intensifying the labor process or relatively by reducing the value of the wage goods that make up the worker's consumption. The extraction of relative surplus value, based on the increase in labor productivity and the ability to produce cheaper wage goods, resulted from organization changes, such as specialization and the division of labor and by machine production powered by fossil fuels. Marxists trace the origins of augmented labor productivity to the forcible separation of workers from the means of production (tools and machines)

during a time at the beginning of the capitalist era Marx called "the Primitive (or prior) Accumulation." The primitive accumulation was not the result of capitalist production, but was rather a precondition or point of departure. The primitive accumulation began in agriculture, not industry, with the break-up of feudal estates. Peasants or serfs were separated from the land and transformed into "free" workers, free in the sense of being separated from the land and the means of production and free from the feudal claims to subsistence. Capitalism requires the separation of workers from the means of production, and the primitive accumulation was the historical process by which this occurred. The primary mechanism of this separation was a series of enclosure movements, which lasted from the 14th into the 19th centuries. In the pre-fossil-fuel era (known technically as manufacturing—manu being derived from mano or hand), capitalists expanded the scale of production by means of natural sources, primarily water power. The expansion of Flemish textile mills created the demand for wool, and the former common lands of the peasantry were "enclosed" or converted into pasture land for the grazing of sheep, hurling the free peasants into the, yet undeveloped, labor markets, thereby creating a crisis of unemployment, until home markets could be developed [9,10].

Marx also makes an important distinction between wealth and value that many contemporary economists do not consider. Wealth consisted of use values, and the source of much wealth was found in nature. Without the use values of inputs, such as resources and energy, no production could occur. But, value or price was derived from human labor capable of producing surplus value. The products of nature only transferred their value when capitalized. Most economists and social theorists (e.g., David Ricardo) treated nature's contribution as "a free gift." Value or price depended upon the amount of human labor embodied in the commodity [9]. The debate about how seriously Marx took issues of nature remains controversial to this day and forms one of the differences between the CNS approach and the Monthly Review School. For Marx, the primary contradiction was between social production (many interdependent workers, merchants and capitalists were responsible for production) and private appropriation. Surplus value was capitalized as private profit and reinvested in the expansion of the business. Growth or more properly, capital accumulation, was built into the dynamic of capitalism from the level of the individual enterprise. However, this reinvestment process was not smooth. Capitalists needed to expand the scope of their factories and markets. This entailed increasing the organic composition of capital (or the capital labor ratio) in order to increase labor productivity, as well as to create new products and processes. Recall that only living labor creates new value in the theoretical framework of classical political economy. When the rate of surplus value (a measure of labor productivity) rises faster than does the capital-labor ratio, profits will rise. However, eventually under conditions of price competition, the value of the capital-labor ratio rises faster than does the rate of surplus value. Profits then fall and an economic crisis commences. In the crisis, the conditions that created it, the rise of the organic composition and the fall in the rate of surplus value, are rectified. Excess capacity and bad debts are written off, and unemployed workers are willing to work harder for less. The organic composition falls and the rate of surplus value rises, issuing in a new era of capital accumulation and growth. In the process, however, capitals become concentrated or larger in scale and more centralized or owned by fewer capitalists. In short, the inevitable outcome of capitalist competition is a tendency towards monopoly.

In 1966, Paul Baran and Paul Sweezy published their "Essay on the American Economic and Social Order," entitled Monopoly Capital [11]. They argued that the level of monopoly concentration that

Marx had merely predicted had become the dominant business structure by the 20th century. Rather than competing on the basis of price, monopolists competed by expanding market share and reducing costs. Baran and Sweezy use the term monopoly broadly and to mean concentrated industry, rather than as the narrow "single seller" of neoclassical economic theory. Sweezy, after all, was responsible for the "kinked" oligopoly demand curve, a concept rarely transmitted to today's students. Since, in their analysis, the mechanism that drove the tendency for the rate of profit to fall was price competition among capitalists, the very nature of value changed with the emergence of monopoly capital. Rather than a "decennial cycle" of prosperity and depression, the normal state of monopoly capital was long-term stagnation or slow economic growth. The source of the stagnation was a rising economic surplus that could not be fully absorbed by the spending outlets available: investment, consumption and waste. Baran and Sweezy chronicled why investment was insufficient, further developing an idea made famous by Evesy Domar. Investment creates additional capacity even as it serves as a spending outlet (or absorbs the economic surplus). Spending is short lived, while the investment is long lived, and the problem becomes both perpetual and unsolvable by further incremental investment. Moreover, the system is burdened by excess capacity, which is a chronic condition of monopolistic industrial organization [12], and one cannot rely on vibrant investment in a time when much capital remains unutilized. Consequently, the growth trajectory of a capitalist economy is unstable. Mainstream economic growth theory results from a critique of the work of Domar, along with that of Roy Harrod. In 1956, Robert Solow published "A Contribution to the Theory of Economic Growth." In this article, he contended that Harrod and Domar postulated fixed technical conditions of production (although this assumption appears explicitly in neither the original books nor papers of Harrod or Domar.) Solow, claiming that resource substitutability is a "crucial" assumption, substituted a Cobb-Douglas production function for Harrod and Domar's supposed fixed-production isoquants. Presto! The instability of the system disappears, and a fundamental social problem of economic instability is transformed into an easily-solvable technical problem. Yet, despite Solow's prominence and the virtual disappearance of the original work of Harrod and Domar from the teaching of economic growth theory, the vast social problems of stagnation and unemployment persist even in today's economy [13]. Even with the advent of a sales effort to expand conspicuous consumption, the level of spending by capitalists and workers is inadequate to the task of surplus absorption, and government spending was discouraged when it competed effectively with the private sector. This leaves waste, in the form of planned obsolescence and military spending, not to mention fuel inefficiency, as a primary mechanism of surplus absorption. This is a crucial point. If waste is built into the very structures of systemic maintenance in the era of monopoly capital, then sustainability cannot be achieved by increases in efficiency alone. Furthermore, conspicuous consumption is not simply bad behavior on the part of privileged consumers. Rather, it is a fundamental part of the system. In order to achieve sustainability, one must change the institutions that perpetuate waste as a condition of macroeconomic stability and growth.

The empirical record of periods of prosperity was explained by deviations from the normal that took the shape of either epoch-making innovations that fundamentally transformed production and absorbed inordinate amounts of investment capital or war and its aftermath. Baran and Sweezy enunciated three such epoch-making innovations: the steam engine, the railroad and the automobile. While they did not focus on energy, it must be mentioned that all of these innovations were energy-intensive and were

essential in transforming the economy into one that is presently so fossil fuel dependent. The latter innovations entailed the replacement of a lower EROI fuels (e.g., coal) with higher EROI fuels (e.g., oil and gasoline), which were more energy dense and more easily transportable. In addition, they could be more easily used and were an important factor in the expansion of consumer markets. Moreover, another such energy-intensive epoch making innovation is unlikely to be forthcoming in the second half of the age of oil, as energy quality and the EROI begin to decline. The long post-World War II expansion was driven by both the automobile booms and the military and economic hegemony of the United States before the 1970s [11]. In the 1970s, the economy began to stagnate once again, as economic growth rates began their long decline. Sweezy, along with Harry Magdoff, began to turn their attention to the growth of the financial economy. Most mainstream analysts saw the growth of the "Casino Economy" as a drain on productive assets diverted into speculation. Magdoff and Sweezy argued instead that the growth of the financial sector (FIRE—finance, insurance and real estate) and complex financial instruments were the result of a fundamentally stagnant real economy with few lucrative investment opportunities. They also chronicled the virtual explosion of debt and noted how it increased the vulnerability of the economy to crisis and limited the government's ability to respond to the crisis with the traditional tools of fiscal and monetary policy, which depend primarily upon the increase in debt [14–16]. Commenting upon the stock market crash of 1987, Sweezy and Madgoff wrote:

But, you may ask, won't the powers that be step into the breach again and abort the crisis before it gets a chance to run its course? Yes, certainly. That, by now, is standard operating procedure, and it cannot be excluded that it will succeed in the same ambitious sense that it did after the 1987 stock market crash. If so, we will have the whole process to go through again on a more elevated, a more precarious level. But sooner or later, next time or further down the road, it will not succeed [15].

It seems that history has absolved Magdoff and Sweezy and given credibility to their prescient statement of twenty-five years ago.

In the preface of Monopoly Capital, Baran and Sweezy acknowledged that they had omitted any analysis of the labor process or the transformation of the products of nature into commodities by means of human labor, from their analysis. That omission was rectified in 1974 when Harry Braverman, director of Monthly Review Press, published Labor and Monopoly Capital [17]. Braverman argued that it was capitalist development itself that removed the meaning from work and left degraded labor in its wake. The expansion of production in the monopoly capitalist (and fossil fuel) era created a contradiction at the point of production. Craft workers who embodied not only physical skill, but also the overall conceptual knowledge of the production process, would be harmed by the new technologically-based attempts to increase surplus value. Consequently, they voluntarily restricted output (what Frederick Taylor called "systematic soldiering") and opposed the kinds of technological change that would degrade their conditions of work. Braverman chronicles the development of scientific management whereby capitalists and managers severed the link between conception and execution and appropriated craft knowledge as part of "management rights." He also explored the link between skill levels and mechanization and argued that the "deskilling" that had occurred in manufacturing in the 19th and early 20th centuries was happening in the service industries at the time of publication [17]. In short, once cannot expect to create a sustainable world of small-scale local and regional producers whose labor process is meaningful, while retaining, in place, the same

economic system that degraded labor, in pursuit of increased productivity and higher profits, in the first place.

Following the deaths of Paul Sweezy and Harry Magdoff, John Bellamy Foster acceded to the editorship of Monthly Review. Foster has continued to write in the legacy of Baran and Sweezy's idea that the normal state of the monopoly stage of capitalism is stagnation and upon the importance of the finance, as well is the vulnerabilities of the system of globalized monopoly finance capitalism. Foster had already distinguished himself as an environmental sociologist before he became the editor of Monthly Review. Foster's main contention is that capitalism creates a metabolic rift in the relation between humans and nature and that capitalism is based upon the exploitation of nature, as well as the exploitation of labor. He points to Volume III of Marx's Capital [18], especially the chapters on "Ground Rent," and focuses upon the influence of Justus von Liebig's chemistry on Marx's thinking. Liebig had characterized mass production agriculture (or English High Agriculture) as a generalized system of robbery, whereby the nutrients are stripped from the countryside and shipped to the city, leaving a legacy of urban waste and pollution in the midst of a countryside facing fertilizer shortages. The growth of the economy simply exacerbates this problem and has been doing so since mercantile days. After the supply of nitrogen-leaching bones were fully scoured from the battlefields of the Napoleonic Wars and the South American guano deposits were fully exploited, the crisis intensified. The industrial revolution simply handed mass-production agriculture more inputs (mostly petrochemical) by which to destroy the soil. Attempts to solve the fractured relationship between humans and nature by means of growth and accumulation have worsened the environmental crisis in its many dimensions. For Marx and Foster, sustainability means healing the metabolic rift by the elimination of wage labor and its replacement by a system of associated producers. Sustainability of capital accumulation and sustainability of the planet's ecosystems are incompatible, and the current economic structure must be transformed in order for ecological sustainability to triumph [19,20]. The vision of many sustainability activists, which is one of small scale organic agriculture in the midst of healthy rural communities, would be impossible to achieve in the present institutional context. Indeed, the evidence of multinational land acquisitions in the era of ecological crisis-driven food shortages shows the opposite process, especially in Africa.

In his latest works, Foster and co-authors provide a compelling argument that a non-growing form of small-scale steady-state capitalism favored by many environmentalists would be not simply difficult, but impossible, to achieve. Capital in the tradition of Marxian political economy is not a thing (be it money or machinery), but a process of self-expanding value. If capitalists do not reinvest the surplus value appropriated from the unpaid labor of workers and reinvest it in improved means of production, they will cease to be capitalists. Marx presented a formal version of simple reproduction or a steady-state economy, but only as a theoretical convenience. The actual economy was based on expanded reproduction, necessitating economic growth and the accumulation of capital.

The endemic need for growth was only exacerbated in the era of monopoly capital that Marx did not live to see fully developed. Building upon the argument of Baran and Sweezy, Magdoff and Foster build a case that the strategy of profit making in the monopoly era, that of reducing costs and increasing market share, assert that this has resulted in the growth of globalized monopoly finance capitalism, and concentrated firms span the globe in search of markets, resources, labor and money capital. The system simply could not exist if these sources of profit and capital accumulation were to

be eliminated in favor of small-scale local price competition. The book also provides a useful critique of "natural capitalism," as well as providing up-to-date data on the limits posed by climate change and resource shortages [21].

In the most recent "Review of the Month", Foster and Clark reiterate the argument that capital is self-expanding value and that the need for growth is perpetuated in the monopoly era. Capitalism in its monopoly stage, with high productivity and prone of overproduction and stagnations, depends upon a variety of methods by which to absorb economic surplus, from an ever-expanding sales effort, to an imposing military economy, to the reliance upon speculative finance when the efforts at surplus absorption are insufficient and the inherent stagnationist tendencies set in. In the vision of mainstream economists, capitalism is based upon efficiency. From the standpoint of the Monthly Review School (with which this author concurs), it is "an economy of built-in waste; both economic and ecological" [22]. Foster and Clark also extend the argument of Howard and Elizabeth Odum [23] that achieving sustainability entails finding "a prosperous way down." However, the conditions that the Odum's enunciated for finding this path, such as maintenance investment instead of accumulation, income inequality, public employment, the elimination of packaging and especially the sharing of information without profit and the promotion of equity between nations are essentially incompatible with the dictates of capital accumulation in the monopoly era. If globalized monopoly finance capitalism is unsustainable and small-scale local capitalism unattainable, society based upon associated producers, in other words, socialism, appears as a viable option [22]. To the degree that environmentalists refuse to entertain this option is the degree to which only lip-service is given to sustainability.

The second school of political ecology is associated with the work of James O'Connor and the journal Capitalism, Nature and Socialism (CNS). Before the founding of (CNS), O'Connor gained fame with the publication of his influential book, The Fiscal Crisis of the State, in 1973. In this work, O'Connor follows the tradition of Baran and Sweezy by dividing the economy into a competitive sector, a monopoly sector and a state sector. The modern state evolved with the monopoly sector and served its interest. O'Connor accepts and develops the idea that the economy, in the absence of the state sector, can generate sufficient aggregate demand, and the system would fall into long-term stagnation in the absence of significant state expenditures. Government spending does more than simply boost aggregate demand. It also provides the infrastructure needed for the reduction of costs (transportation, *etc*.), capital accumulation and a large military needed to keep the world safe for multinational investment. State expenditures also take the form of social spending. Such spending not only increases the income needed for consumption, but also keeps the domestic peace by means of welfare programs. However, the expansion of the monopoly and state sectors also creates a tendency towards profound fiscal crisis. The increases in public investment, the military and social maintenance programs needed for social reproduction tend to grow faster than do revenues. As social expenses rise, the state is compelled to socialize them. Those concerned with "the fiscal cliff" in the United States and austerity programs in the European Union would do well by rereading The Fiscal Crisis of the State to see the close connection between the rise of monopoly, economic stagnation and the growth of state expenditures and growing public debt.

O'Connor also traces the crucial role of productivity growth. He argues that productivity growth and productive capacity grow more rapidly than do the demand for labor and employment. This gap is exacerbated by the growth in social expenditures. However, productivity growth in the absence of

consumption and investment growth result in recession, unemployment and the build-up of excess capacity. Put simply, the economic system's tendency towards overproduction is counteracted by the increase in state expenditures [24]. Monopoly capitalism, abetted by the state, must grow, and the role of the state has been primarily expansionary for the past four decades

More recently, in the pages of *CNS*, O'Connor theorizes that the first contradiction of capital was explained well by Marx as a contradiction between rapidly changing forces of production (e.g., technology) and slowly changing (class) relations of production. This contradiction was manifest as overproduction and a realization crisis or lack of sufficient effective demand and created a working class opposition in the form of a labor movement. According to the *CNS* perspective, capitalism is subject to a second contradiction between the forces and relations of production and the conditions of production, such as the external physical environment. The second contradiction is manifested not as a demand-side crisis of overproduction, but as a supply-side liquidity crisis (or underproduction of capital) [25]. This is important because one of the nagging questions today is whether the reeling system of credit and debt and the State can procure and mobilize sufficient money capital to fund the adaptation to an energy-short, climate compromised world. While the first contradiction produced a labor movement, the second produced an array of new social change, social justice and civil society movements as the primary agents of change. O'Connor's "second contradiction" thesis relies on the work of Karl Polanyi [26]: that capitalism systematically undermines the biophysical conditions that it depends upon in the pursuit of capital accumulation. He also advances the position that both the degradation of the environment and the social movements raise the expenses and costs of capital and serve as limits to further capital accumulation. O'Connor distinguishes between internal limits found in the contradictions of capital accumulation and realization crises and external limits found in the environmental conditions of production and also makes the important observation that economic crises and transitions are the times in which social institutions are restructured It is important, however, to recognize that there are no automatic connections between biophysical limits, increases in costs and the end of capital accumulation. The very nature of global financialized monopoly capitalism allows powerful firms to acquire increasing profits. Financial profits, as well as those of energy companies, have soared as employment has stagnated, and debt has risen to crisis proportions despite the "end" of the financial crisis of 2008–2009 and the continuation of environmental degradation. As Foster puts it: "we should not underestimate the willingness and ability of finance capital to further degrade the planet's biophysical systems in pursuit of capital accumulation" [19]. Solutions must come from the "bottom up," and to O'Connor's credit, he recognizes the importance of social mobilization. Considerable debate still exists in the pages of *CNS* concerning the politics and economics of degrowth and sustainability. In the Special Issue on Degrowth, Joan Martinez-Alier links the need for degrowth in order to minimize the planetary overshoot that already exists with the need for environmental justice. He makes the point that too many on the left see environmentalism as a luxury of the rich. He points out the many struggles of the global environmental justice movement and queries whether a decline in resource imperialism is consistent with expanding capital accumulation. Even a steady-state capitalism needs new inputs of energy, because low entropy energy inevitably degrades into waste heat in the process of doing work and energy simply cannot be recycled. Questions of energy imperialism and resource extraction will dominate the 21st century. The degrowth movement was born of the struggles of the poor over questions, such as housing rights, recycling and waste prevention. The poor

of the environmental justice movement and the degrowth theorists and activists are natural allies [27]. This alliance is reflected in the composition of the programs of the many degrowth conferences, of which Martinez-Alier is a major organizer. His position is clear: we cannot possibly attain sustainability without healing the metabolic rift between humans and nature without addressing seriously the conditions of the poor.

However, in the same issue, David Schwartzman critiques the politics of the degrowth movement. He asserts that degrowth activists fail to distinguish between qualitative and quantitative change and are insufficiently focused upon what he terms C3 (catastrophic climate change) and expanding military spending. Growth is not homogeneous. An increase in alternative energy technologies is not the same as an increase in weapons of mass destruction, although they are both aggregated into GDP calculations. Schwartzman believes strongly that advances in wind and solar energies can enhance the quality of life without the negative externalities of fossil fuels and dismisses peak oil adherents as those who promise a future of unimaginable misery [28]. He presents data on the growing share of alternative energies, but does not speak to the issue of the energy return on investment of these alternatives. While wind power has an EROI of about 18:1, the EROI of solar photovoltaics is less than 7:1, and concentrating collectors are less than 2:1 [8]. Moreover, many of the rare earth metals needed as inputs for the solar economy, such as germanium, tellurium and indium, are themselves at or near peak and are projected to be depleted in 18–35 years. Most of these vital secondary metals are unprofitable to mine in and of themselves, but are by-products of aluminum, copper and zinc, which may be depleted in as little as 17 years [29]. This is scarcely enough time to gear up an industry that will transcend C3. While it is not impossible that unknown technologies may provide more efficient energy, the technical details are not the only constraints, as technology always develops within an institutional structure. Apart from scientific discovery, how will new technologies affect capital accumulation? If rising costs result in a supply-side crisis, the reduction of input costs could perpetuate capital accumulation well into the future.

The fundamental questions are not simply technical. They also concern the nature of capital accumulation and growth and the institutional structure in which capital accumulation takes place. Is capitalism possible in the absence of growth? Can a non-growing society be a capitalist one? Both schools rely on historical analysis and place current economic activity, especially the roles of finance and the State, in an institutional context subject to the complex dynamics of capital accumulation. Much the same can be said about the Social Structure of Accumulation School.

5. Social Structure of Accumulation

The Social Structure of Accumulation School began in the mid-1970s in an attempt to explain why labor markets were segmented and why low-wage workers did not compete in high-wage labor markets. Within a decade, SSA theorists had grounded the reasons as to why in a historical and institutional context. Their theoretical framework was that of long swings in economic activity first identified by Nikolai Kondratieff in the 1920s, and SSA adherents began to link their phases of expansion and contraction to changes in the labor process and labor markets. The institutional revival showed that the markets are embedded within a context of social institutions. Just like embedding the economy in a finite and non-growing biophysical system forces us to think about the limits of the

primary system, embedding the functioning of markets within a broader social system forces us to think about the interaction of markets with the broader set of institutions. Phillip O'Hara summarizes this position succinctly when he states: "The system requires certain 'public goods' or systems functions' to promote accord, agreement, organization, communication and information to moderate conflict and instability that so-called 'free markets' would otherwise largely be without" [30]. Moreover, the institutions contain contradictory forces, which manifest themselves as class conflicts over time. While ecological economists have produced a great deal of excellent work estimating the ecological limits to the human economy, much less attention has been paid to social limits. Viewing markets as part of an integrated system that are shaped by changes in income distribution, capital accumulation and political processes, rather than as an isolated allocative mechanism, can lead to potentially fruitful understanding of how to limit growth while meeting human needs.

By 1979, Richard C. Edwards published Contested Terrain [21], where he argued that labor market segments evolved historically in response to crises of control at the point of production. Different systems of control characterized different segments of the labor force, and these systems evolved over time with three transformations.

The goal was both to retain control over the process of production and to maintain social control. In the era following the Second World War, a new set of rules evolved concerning labor markets and the labor process as capital began to share a fraction of accumulated surplus value with as small segment of the working class, predominantly white males working in the monopoly sector. The rules were designed to link the interests of the workers to those of the firm and were geared towards long-term capital accumulation within the firm by means of job ladders and grievance procedures, but also through the increased demand brought forth by higher wages [31].

The Social Structure of Accumulation approach made its formal appearance with the 1982 publication of Segmented Work, Divided Workers by David Gordon, Richard Edwards and Michael Reich [32]. In this work, they identified four separate long swings in the economy and explained their expansion and contraction by means of changes in the institutional structure that supports profit making and enables long-term accumulation of capital. This institutional arrangement was called the social structure of accumulation. At least two important questions remained to be answered. Could a global phenomenon, such as long swings in economic activity, be explained fully by changes in the labor process in the United States? Secondly, does the demise of one social structure of accumulation lead automatically to the consolidation of a new one that creates the institutional structure for a new round of growth? The emphasis on the Kondratieff cycles separates the SSA school from political ecology, which is based on Baran and Sweezy's idea that the monopoly phase of capitalism has an inherent tendency towards stagnation or that stagnation is the normal state of monopoly capitalism.

The social structure of accumulation theorists responded to the first question in 1990 by expanding their conception from a labor process-based SSA of segmentation to a broader post-war social structure of accumulation. In response to the second question, the SSA approach still employs the notion of long-swings. In After the Wasteland [33], Sam Bowles, David Gordon and Thomas Weisskopf specified four pillars of prosperity upon which the postwar SSA was consolidated. These included Pax Americana or the postwar peace established upon the basis of US dominance of manufacturing and military might. Also included was the strong impact of the US upon the reconfiguration of the world's money at the 1944 International Monetary Conference in Bretton

Woods. A second core institution was the limited capital-labor accord whereby mostly white male, unionized, manufacturing workers negotiated the sharing of productivity gains with capital. The higher wages associated with productivity bargaining helped assure adequate levels of aggregate demand. A capital-citizen accord produced a mild Keynesian welfare state, as the gains of the New Deal were expanded to include a health care plan for the elderly, a limited amount of public housing, a policy geared towards full employment and a social safety net. Citizen groups from unions to civil rights demonstrators to students were united in growth coalitions in support of economic growth. A uniting of citizens behind a strong agenda of growth lessened the pressure for the redistribution of income. Finally, anti-trust laws and regulations were applied in way as to accept large-scale corporations where they existed, plus the co-respective behavior of oligopoly firms effectively limited the kind of cutthroat competition that proved so ruinous in the long decline of the 1870s–1890s. Hall and Klitgaard assert that the availability of cheap oil was a crucial factor in both the industrial revolution and postwar prosperity and not peripheral, as Bowles and colleagues treat it. Moreover, the advent of biophysical constraints calls into question whether a new growth-promoting SSA can be consolidated at all [8].

This was sufficient to produce growing productivity, rising profits and strong capital accumulation and growth until the early 1970s, when internal and external forces combined to cause the decay of the postwar SSA. The costs of maintaining a complex empire began to mount and add to the country's balance of payments deficit, and the decline of US power was punctuated by a military defeat in Vietnam. Moreover, the domestic supply of oil peaked in 1970, and in 1973, the country was subjected to significant run-ups in the price of oil and gasoline. The Bretton Woods Accords, predicated on the willingness of the US to convert currency claims to gold at $35 per ounce, collapsed when the volume of claims exceeded the gold stock. Facing the decline of US hegemony, profits began to fall, and US corporations could no longer "afford" a limited capital labor accord. The postwar SSA simply could not withstand the myriad pressures of the stagflation era and began to decay. Productivity growth declined from 2.7% per year in the 1950s to 0.3% per year in the 1970s, while GNP growth declined accordingly, from 4% in the 1950s and 1960s to 2.6% per year in the 1980s [23]. It is worth mentioning that productivity indices were developed to measure output per worker in manufacturing. Accurately measuring productivity in the service economy poses myriad problems, not the least of which is the dependence of productivity upon the level of output, a crucial factor in a non-growing economy. The success of the 1960s Keynesian policies depended upon growth. When the growth was not forthcoming due to the dynamics of international competition and the first salvos of biophysical limits (in the form of "oil shocks"), Keynesianism and the liberal growth coalitions could no longer "deliver the goods." Yet, a new SSA was not immediately constructed, as the groups and classes that benefited from the old institutional arrangement still possessed sufficient power to block a new and more conservative agenda based upon more business friendly principles. A period of impasse ensued for nearly a decade, punctuated by the take-over of the US Embassy in Tehran and a second spike in oil prices in 1979.

Out of this decay of the old order, a new SSA was explored. The new approach, termed "right-wing economics", consisted of a commitment to five major policy initiatives designed to reverse the declines in productivity growth, corporate profitability and international powers. Because contradictory forces existed in the institutional structure, the acceptance of the right-wing program did not lead to rapid capital accumulation. The tight money policy that served to reduce inflation and break the power of

labor also increased interest rates enough to choke off real investment, largely through increases in excess capacity. High interest rates draw foreign portfolio capital and increase the value of the dollar on international markets. This is beneficial, as it makes access to raw materials, especially dollar-denominated oil, cheaper. However, the same high interest rates make exports more expensive and exacerbated the trade deficit that emerged in the 1980s. Although the profit share (π/Y) increased with the increase in inequality, the output capital ratio fell sufficiently due to the expansion of excess capacity that the growth in profit rates remained sluggish. In other words, the profit rate = the profit share times the output capital ratio. $\pi/K = \pi/Y \times Y/K$. The contradictory effects of high interest rates and tax reductions made the two components on the right side of the equation neutralize one another. In the end, the 1980s produced economic growth, but slower growth that was based primarily on the expansion of debt, not upon investment [33]. It was growth that could not be sustained.

By the early years of the 21st century, SSA theorists debated whether the conservative explorations of the 1980s had been consolidated into a new SSA based on neoliberalism. Wolfson and Kotz argue that a new neoliberal SSA was consolidated over the last decades of the 1900s. "In our view, it has now become clear that neoliberalism is not a continuation of the crisis of the old postwar SSA, because it constituted a new, coherent, institutional structure that has been in existence since at least the early 1980s" [34]. David Kotz argues that a core set of neoliberal institutions have been sufficiently implemented to establish a new SSA. These include (1) a belief in small government, (2) deregulation of domestic finance, (3) deregulation of labor markets and a more market-based approach to industrial relations, (4) the free movement of international money capital and finance, (5) international relations to establish US military power and (6) the advancement of the belief that the neoliberal agenda was inevitable [25].

However, they also believe that the internal dynamics and contradictions of the neoliberal SSA have not manifested themselves as rapidly and sustained capital accumulation. The rate of GDP growth in the neoliberal SSA (1990–2007) was 2.99% per year, a rate not significantly higher than the growth rate of 2.93% during the decay of the postwar SSA. The deregulation of finance has led to an expansion of debt and the rise of asset bubbles, and the traditional role of the SSA in balancing the rivalry between industry and finance has not been forthcoming. The balance has been tipped towards finance. The increase in inequality has made it difficult to resolve the conflict between productivity increases and effective demand. The postwar SSA capital-labor accord allowed the sharing of productivity gains, which led to increased consumption. The neoliberal SSA is based on the idea that productivity gains belong to capital. This exacerbates the problem of effective demand and pushes consumers to contract increasing amounts of debt. The trade and payments deficits plus the globalization of finance removes the independence of domestic authorities. The United States has reached the limits of economic expansion by means of fiscal policy and is at or near, the limits of monetary policy. Once interest rates have fallen to virtually zero, there are few policy options.

Phillip O'Hara and Victor Lippit argue separately that the neoliberal SSA was never fully consolidated. The components of the SSA are not independent, but interactive, and each overdetermines the other; it is the overdetermination that makes the SSA a structure. The inability for the neoliberal SSA to consolidate fully was based on changes in the constituent institutions, internal contradictions within the institutions and the impact of exogenous events [35]. O'Hara ends his work with a program to initiate sustainable, holistic, growth, largely by means of progressive policies to

encourage productive public investment in infrastructure and high value added investment in the private sector. But, from the standpoint of biophysical and degrowth economics, sustainable growth is oxymoronic. If every scientific measure of human impact upon nature (climate change, peak oil, ecological footprinting, biodiversity loss, ocean acidification, *etc.*) indicates that we are in overshoot, then there is no possibility of growing our way into sustainability. At the same time, if the function of markets and the supporting institutional structure demands growth to achieve a stable prosperous economy, the absence of growth is seen as economic crisis. Wolfson and Kotz state the matter forthrightly: "Capitalism does indeed display a powerful accumulation drive. That drive is one of its central features. It is doubtful whether capitalism could survive without the accumulation of capital—it would be torn apart by the conflict without an "expanding pie" [36]. To what degree can the SSA approach a valuable theoretical framework in the era of binding biophysical constraints? If the theory is meant to explain the next round of growth, then the theory is limited in the era of degrowth. If SSA theory can be adapted to include the idea that biophysical, as well as social factors, limit capital accumulation over the long-term and that social and biophysical forces interact in determining the institutional structure, some valuable insights can be gained. A paper by Minqi Li appeared in the Growth and Crisis: Social Structure of Accumulation Theory and Analysis arguing for incorporation of biophysical limits into the SSA framework. Li enunciates the major limits of peak oil and climate change and argues that these must limit capital accumulation as well. Interestingly, this paper, while published in the aforementioned SSA compendium, remains somewhat outside the SSA mainstream. It is cast in terms of the tendency for the rate of profit to fall. The connection to the body of SSA thought is found in his use of the profit rate developed by Bowles *et al.*, rather than in traditional Marxian terms [37]. It is a welcome sign that a body of theory that links well-being to the next round of growth can accept an argument grounded in the idea that biophysical constraints make long-term growth impossible.

This is the dilemma that we must face directly. If an economy is at its biophysical limits, it cannot continue to grow without risking potentially severe ecological crises in the near future. But, if a growth-dependent economy fails to grow, it produces unemployment, loss of wealth and social dislocation in the immediate period. Unfortunately, there is no environmental equivalent of the business cycle. Ecological crises are the result of long-term cumulative changes that are not resolved by the conditions of depressions or recessions [19]. While the existing SSA literature pays scant attention to biophysical limits or environmental consequences, the neoclassically-based ideal of allocatively efficient markets, found in much of ecological economics as well, fails to recognize that market outcomes are themselves embedded in historical social contexts. Using an institutional frame of analytical reference is vital in order to consider the environmental and economic consequences of impending biophysical limits to growth. What the future needs, quite frankly, is a social structure of deaccumulation (a term used by both Klitgaard and Krall and Foster, unbeknownst to one another at the time) [2,38]. We need a series of institutions that create stability and reduce conflict without the need for further economic growth. We need, in the words of the Odum's, a prosperous way down.

6. A Sustainable Economic Vision

A sustainable society must, given the current overshoot of nature's limits, be a non-growing society. But, it must also meet the needs of people for income, healthcare, employment and chances to increase their capabilities and provide opportunities for the next generation. In the absence of growth, a more equal income distribution is essential. Meaningful work, which produces needed use values and allows control on the part of the producer, will become a necessity for well-being in an age when increased consumption is no longer viable. Declining energy quality will necessitate more local production and distribution. Community should replace commerce.

As the fundamental principles of the metabolic rift show, this change is essentially impossible without also transforming the structures of globalized monopoly finance capitalism and neoliberal governance structure. If capitalism must grow and the biophysical world will not allow growth, then capitalism cannot be the instrument for achieving sustainability. We will need to change the basic social institutions, technologies and human behavior if we desire to achieve a sustainable balance with nature. Entrepreneurial innovation will not lead us to sustainability. Entrepreneurial capitalism is as dependent upon growth as any other form of capitalism. After all, financial innovation yielded little more than the complex derivative securities that precipitated the recent financial debacle and a rapid increase in income inequality. I do not discount technological change. In fact, it is my great hope that the tremendous advances in scientific understanding that accompanied the hydrocarbon and capitalist ages will allow us to appropriate the solar flow far more effectively than did our medieval ancestors. But, in the end, we will be dependent once more upon the solar flow. Given this many of the more technologically optimistic scenarios do not deal sufficiently with the questions of energy quality, declining EROI, cost and the potential diversion of discretionary income simply into energy purchases, leaving little else for "economic development." If we desire a small-scale local economy, then this economy needs to be one based upon a community of associated producers. While a few small businesses may function perfectly well in a non-growing environment, with their entrepreneurs content on merely maintaining their statues, this is not the way capitalism function as a system! Capitalism as a system has been growth-dependent since its inception. The binding biophysical constraints do not allow us the luxury of changing the system one progressive entrepreneur at a time.

A sustainable economic theory must integrate production, consumption, work, finance, energy and policy, to name but a few characteristics. The theories of heterodox political economy outlined above represent a far superior starting point for a theory of sustainability precisely because they include economic activity and policy, as well as technology, in institutional and historical contexts. In the absence of historical and institutional analyses, we may all fall victim to greenwashing and technological quick fixes.

7. Conclusion

In the introduction to this essay, I called for a new theory that contains a real world analysis, a historical context, analyses of economic crises, foci on work, productivity and energy and a vision of the future. The real world we live in entails an economic system of globalized monopoly finance capitalism that must grow, encountering a set of biophysical limits that eventually will preclude

growth. Historically capitalism is defined as self-expanding value by means of capital accumulation. It is a system based on growth and accumulation and has been since its inception. Even if we could turn back the clock to the competitive era, capitalism would still be based on accumulation and growth. But, we can't turn back the clock. We can only limit the damage by means of a smaller economy. But, a smaller economy within the context of monopoly capital means increased human misery. Capitalists will still strive to grow despite potentially catastrophic damage, for they can do little else and remain capitalists. We can simply not grow our way into sustainability. We must change the structures that demand the increased use of energy and materials, as well as the increased production of carbon. How to accomplish this task, given the power of monopoly capital, will be a difficult matter. There is no reason to believe that the economy will simply break down as biophysical constraints loom closer. We must organize to replace what we have with a rational and humane social system.

The various schools of heterodox political economy provide different insights into how to accomplish this. The *CNS* school is based on the idea of a second contradiction and the idea that capitalism is both crisis prone and crisisdependent. Times of crisis are times of restructuring, and the agents of change are to be found in the civil society movement. The paper by Joan Martinez-Alier, calling for the alliance of degrowth theorists and the environmental justice movement, is an excellent example of how and why these alliances need be made.

The SSA school provides some important insights on institutional change, but is peripherally related to the struggle for sustainability at this time. Their main contribution is a focus on how changes in the labor process affect the overall economic structure. If sustainability is to be based on meaningful work, then studies of how work has been transformed are valuable to how work may be transformed in the future, even if the connection to sustainability is vague and indirect. As the limits to growth become more apparent, one can hope that the focus on structural change can outweigh the emphasis on establishing a new growth regime as the old decay. It is unclear what the forces for change are, other than the traditional labor movement and a belief in a slow social democratic transition. But, if we cannot transit to a new growth regime, then the theory itself needs to change and adapt. Hopefully, the SSA proponents will realize the impending biophysical limits and solicit theorists of a deaccumulation perspective.

The most valuable contributions, in this author's opinion, are those made by the *Monthly Review* School. The journal was founded in 1949, was one of the sole bastions of socialist thought in the United States through the dark days of the McCarthy era and has supported socialist scholars and activists from across the earth, while informing their readers of the events and problems of the world. The real-world data indicate that growth is slowing secularly and that despite right-wing political control of the reigns of the U.S. government, a new social structure of accumulation has not been fully consolidated. Monthly Review speaks clearly to the issue of an economy that must grow conflicting with the internal systemic constraints of capital accumulation in conjunction with biophysical constraints that do not allow for growth. In order to achieve a prosperous way down, we must transform the nature of globalized monopoly finance capitalism. Achieving degrowth and a steady state without this transformation will simply be impossible. *MR* has championed domestic political and environmental activism, along with substantial support to national liberation struggles, the rights of indigenous peoples and global civil society movements since its inception. It is my hope that this brief essay will motivate degrowth scholars to delve deeply into a literature that is capable of analyzing the present economy and creating a viable, rational, sustainable one for the future.

Conflict of Interest

The author declares no conflict of interest.

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