THE TREADMILL OF PRODUCTION: AN APPRECIATION, ASSESSMENT, AND AGENDA FOR RESEARCH [1]

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ABSTRACT The work of Pellow, Gould, Schnaiberg, and Weinberg (particularly Schnaiberg's *The Environment* and his notion of the treadmill of production) became one of the most influential strands of North American environmental sociology during the late 1970s and early 1980s for a number of reasons. His work was learned, scholarly, and incorporated approaches from a vast range of sociological specialties (political economy, political sociology, social movements, sociology of science). The materialist-realism-objectivism of the treadmill of production notion appealed to environmental sociologists, and was consistent with the then-extant quest by environmental sociologists to restructure sociology along these lines. Schnaiberg's critiques of environmental sacred cows (Malthusianism/populationism, the mainstream environmental movement, appropriate technology, consumptionism, and so on) were provocative. The treadmill of production was anchored in political economy at a time when U.S. sociology was still receptive to neo-Marxism. At the same time the treadmill framework was a multicausal one, being reducible neither to the logic of the state nor to the logic of capital. It is fair to say, though, that the treadmill of production is not as predominant in environmental sociology in the early twenty-first century as it was two decades ago. Some of the reasons for this are unfortunate products of our time—for example, the declining role of neo-Marxism in a scholarly community that must watch its back in an era of neoliberalism. In the final portion of the paper I discuss some shortcomings of the treadmill framework that have led to it being less influential than formerly. It is my view that, to use an automobile repair metaphor, while the treadmill framework is in need of 40,000 mile maintenance, the chassis and components remain in working order.

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"[T]he environment does not care at all about GNP, it cares about absolute amounts of pollutants or extractions" (Joan Martinez-Alier, CNS 14, March 2003, p. 138).

INTRODUCTION

The treadmill of production is arguably the single most important sociological concept and theory to have emerged within North American environmental sociology. The treadmill of production (and North American environmental sociology, for that matter) has not had a huge impact in Europe and elsewhere, the reasons for which are complex but need not occupy us here. Nonetheless, the treadmill of production as a concept and theory is sociologically significant because while the concept is distinctly sociological—in other words, it is based in sociological reasoning, and is not a biological or ecological analogy—it is also a notion that departs from those that predominate in most sociological specialty areas. The treadmill of production departs from mainstream sociology in that its key or penultimate dependent variable—environmental destruction, or "additions" and "withdrawals"—is a biophysical variable. Further, the ontological structure of the treadmill of production is that there are powerful forces leading to capital-intensive economic expansion, which in turn comes into contradiction with a biosphere that is essentially finite in nature. Thus, the treadmill of production is a notion and theory that is sociological, that is at the same time solidly environmental-sociological in nature because biophysical features figure in as both explanans and explanandum.

In this paper I want to take on several major tasks. First, I will make a few brief comments about the contributions that the treadmill of production approach—and the work of Pellow, Gould,

Schnaiberg, and Weinberg—has made to environmental sociology. Second, I will seek to locate the treadmill of production approach within both sociology and environmental sociology. I will identify the reasons why the treadmill of production became a respected anchor of American environmental sociology.

I will suggest, however, that there are several reasons why the impact of the theory of the treadmill of production has not been as great as it could have been. The bulk of the paper will be devoted to addressing these three issues and concerns. I will note that treadmill of production theory has often been misunderstood and been rendered too simplistic by many contemporary observers. I will demonstrate this by developing a typology of eco-Marxisms that will illustrate the specificity of the treadmill approach. I will also make the observation that while the treadmill approach is a longstanding one, the way the past decade or so of the authors' work has proceeded has in some sense masked the fact that the their conception of the treadmill of production has changed a good deal. I will identify the many changes that have been made, placing particular emphasis on the changes that I believe have been most significant. Finally, I will identify what I believe are some of the theoretical and empirical problems that future work—by all of us, and not just Pellow, Schaniberg, Gould, and Weinberg—ought to attend to.

First, a bit of terminology. The treadmill of production can be thought of in four different ways. One meaning is that of a concept (parallel to a concept such as the self-expansion of capital). The second is that of a sociological theory (with a causal or interpretive system involving chains of relationships among social forces/variables). The third meaning is that of the career of work by Allan Schnaiberg. The fourth meaning includes the work of Schnaiberg and of his three main co-authors: Ken Gould, David Pellow, and Adam Weinberg. In this paper I will mainly take the first and second meanings of the treadmill of production to be essentially coterminous, since it seldom happens that the concept of treadmill of production is used apart from the theory of the treadmill.

At the same time, there is the well-known reality that Allan Schnaiberg was the original framer of and prime mover behind the concept. Treadmill of production theory prior to 1990 or so was coterminous with the work of Allan Schaniberg., but I believe he would acknowledge that since that time Gould, Pellow, and Weinberg have provided more than their fair share of the energy behind the enterprise. Thus, I will aim to be precise in my terminology by using Schnaiberg's name when I am referring specifically to him, and using the expressions "the authors" or the "treadmill of production group" when the work being referred to is the collective efforts of the gang of four.

There is also a less obvious reality: What is meant by the treadmill of production has changed over time, so that the substance and details of the theory constitute something of a moving target. This fact makes this terminological exercise all the more important as a preface to understanding the important details of their work.

THE TREADMILL OF PRODUCTION AND NORTH AMERICAN ENVIRONMENTAL SOCIOLOGY: A HISTORY AND APPRECIATION

Most participants in this conference will be roughly familiar with the history of American environmental sociology (but for those who are not, some overviews of this history can be found in Buttel and Gijswijt, 2000, and Dunlap, 1997). By any measure the treadmill of production has played a distinguished role in this history—from virtually the very beginning (roughly 1975) to, of course, the present. For most of the history of American environmental sociology (from the mid-1970s through roughly the mid-1990s) there have been two main research traditions or groups in the field: the treadmill of production group and the Catton-Dunlap group. The Catton-Dunlap group did not formulate a coherent perspective until the late 1970s. Thus, there has arguably been nothing like the treadmill tradition; there has been no other coherent theory that has guided research and scholarship along the entire course of the development of North American (and, to a significant, but lesser degree, international) environmental sociology.

It is useful to recall some of the reasons why this concept and theory have exhibited such a distinguished history. Certainly, one of the key reasons had to do with Allan Schnaiberg himself. Schnaiberg's work was learned, scholarly, and incorporated approaches from a vast range of sociological specialties (political economy, political sociology, social movements, sociology of science). Schnaiberg was trained as a human ecologist/demographer, but he was trained broadly and rapidly expanded the scope of his interests during the few years following receipt of his Ph.D. degree. A scan of the reference lists in his *The Environment* (Schnaiberg, 1980) shows that he had command of and drew on an impressive range of sociological literature as well as literature from other sources. (Among economists alone, his citations in *The Environment* included Arrow, Baumol, Boulding, Boserup, Coase, Galbraith, Haveman, Heilbroner, Landsberg, Krutilla, [Mancur] Olson, Leontief, Myrdal, Okun, Ridker, [Joan] Robinson, [Nathan] Rosenberg, Samuelson, Scitovsky, Solow, Schumpeter, Tinbergen, and Veblen, in addition to Marx and Malthus! Most sociologists cannot name this many famous classical and contemporary economists must less distinguish clearly among their work.) Schnaiberg was well placed, having received his Ph.D. from and having spent his career at two of the powerhouse programs North American sociology programs (Michigan and Northwestern, respectively).

By the mid-1970s environmental sociology had set out for itself a distinctive agenda of advocating a materialist-realist-objectivist posture and being fierce in its agenda of curing sociology of the affliction of considering the biophysical environment as being nothing more than a neutral stage upon which social behavior takes place. As noted earlier, Allan Schnaiberg's work was solidly in that tradition, though Schnaiberg seldom spent time blaming the state of mainstream sociology on the classical theorists, or even on bemoaning the state of mainstream sociology. Early American environmental sociology focused heavily around the study of environmental and conservation organizations. Schnaiberg's theoretical and empirical emphasis on environmental movements

generated additional interest in and attention to his work, even if he tended to be more critical of the superficiality of mainstream environmentalism than was the taste of environmental sociologists at the time.

In the early days of environmental sociology its major practitioners largely finessed the issue of Malthusianism. On one hand, in sociology at large, Malthusianism was generally regarded as an idiocy, for a variety of reasons. Interestingly, the sociological disrespect for Malthus had little to do with Marx's critique of Malthus, and much more to do with so many sociologists having been hoodwinked into thinking that Malthus had been invalidated by the demographic transition and the Green Revolution. On the other hand, environmental sociology's key lever for prompting attention by the sociological community at large—to convince them that the socially induced degradation of the environment was rooted in social structure and was amongst the most important challenges to the future of humankind—had a certain neo-Malthusian overtone, if not a Malthusian basis.[2] Schnaiberg's early presentations of the theory of the treadmill of production, as well as the more recent co-authored studies in this tradition, included pointed critiques of environmental sacred cows (among them Malthusianism/populationism, the mainstream environmental movement, appropriate technology, consumptionism, and so on). But Schnaiberg did so in way that preserved the notion that the environmental challenge is a very real and is a critical social concern. His critiques were—and remain—provocative ones. To be sure, some of the more Malthusian and populationist-inclined environmental sociologists thought these critiques were a bit over the top, but regardless of theoretical taste one could not help but admire the iconoclasm of these critiques and the insights they brought forward. After all, it was important to appeal to the sociological community at large in

[2] For a flavor of a more contemporary sophisticated sociological embrace of neo-Malthusianism, see Redclift (1996).

a sociological way, and not in terms of being a mere purveyor of the current ideologies of environmentalists and environmental scientists.

The treadmill of production was anchored in neo-Marxist political economy at a time when U.S. sociology was still receptive to neo-Marxism. As I will note again below, the neo-Marxism of the treadmill of production was, and remains, a very particular one—initially, a blend of Jim O'Connor's (1973) views on the contradictions of the capitalist state and (fiscal) crisis on one hand, and of "plain Marxism" on the other. By "plain Marxism," I refer to C. Wright Mills' (1962:Chapter 5) well-known three-category typology of Marxism (of "vulgar," "sophisticated," and "plain" Marxism). By "plain Marxism," Mills' preferred variety, he meant a style of Marxist analysis that borrows eclectically from Marx's concepts and insights (e.g., about the importance of class and inequality, the importance of the corporate form of social organization, the tendency toward concentration and centralization of capital) while also eschewing those components of Marx's work or those of contemporary ("sophisticated") Marxists that he thought were empirically vague or inaccurate (e.g., the labor theory of value, the working class as the historical agent of progressive social change). As I will note below, the neo-Marxism incorporated within the theory and notion of the treadmill of production has, however, changed perceptibly over time—from the original combination of O'Connor-influence sophisticated Marxism and of plain Marxism in *The Environment*, to a largely plain-Marxist take on corporate globalization in their most recent work (Weinberg et al., 1996; Schnaiberg et al, 2002). Overall, though, treadmill of production theory has long had a plain-Marxist commitment to a multicausal model; the logic of the treadmill of production is reducible to neither to the logic of capital nor to the logic of the state.

It is fair to say, though, that the treadmill of production is not as predominant in environmental sociology in the early twenty-first century as it was two decades ago. Allan Schnaiberg (2002) has acknowledged this fact, and has observed that the environmental-sociological

community has not been as willing to take up his theoretical leads as much as he would have liked. Some of the reasons for this lack of sustained interest in the treadmill of production are unfortunate products of our time. Most significantly, we have witnessed a declining role of neo-Marxism in a scholarly community that must watch its back in an era of neoliberalism. There has also been a profound postmodernizationism of sociology, especially in the U.K. and elsewhere in Europe, and a parallel rise of cultural sociology. Political economy has yielded to less theoretically ambitious versions of economic sociology and neo-institutionalism.

Ironically, while there are a great many affinities between environmental sociology and neo-Marxism and much of American environmental sociology has been substantially influenced by neo-Marxism, environmental sociology has not been damaged by the decline of neo-Marxism in sociology at large. Indeed, environmental sociology has fared surprisingly well in our current sociological era of the dismissal of grand, totalizing meta-narratives and of growing interest in new cultural forms (including but not limited to environmentalism and its many variants). Environmental sociology has, in fact, grown because of the ease with which notions of social construction, social-natural hybrids, new social movements, and reflexive modernization could be grafted onto it (see Goldman and Schurman, 2000, for an overview of this literature). There has been considerable unrest within environmental sociology over the past decades as the materialist, objectivist, realist core group of the subdiscipline has had to encounter scholars and works whose epistemological or ontological commitments lie toward the subjectivist, idealist, and modernizationist poles (see Buttel and Gijswijt, 2000, Dunlap, 1997, Dunlap and Catton, 1994, Dickens, 2004; and Macnaghten and Urry, 1998, for quite different perspectives on this issue). The theory of the treadmill of production, as well as other materialist, objectivist, and realist perspectives, is now tangibly overshadowed by new forms of environmental sociology.

I believe it is also fair to say that there are a few interrelated problems with the treadmill of production tradition that have led to the model standing in need of both scrutiny and re-affirmation. First, one symptom of the problem is that as familiar as the notion of the treadmill of production seemingly is—and some of our colleagues think they are able to capture its essence in two sentences or a paragraph—the concept is actually quite complex. I think a good many people have a basically superficial understanding of what the treadmill of production actually is, and portray the theory as being more simple or simplistic than is warranted.[3] Some of our colleagues understand the treadmill notion as being "Marxist environmental sociology" or as being "political economy" theory, with little appreciation for the fact that this is a very vague characterization, given the enormous diversity within the Marxist tradition, the even greater diversity within political economy, and even the very considerable diversity in the eco-Marxist tradition of the past 15 or so years. Treadmill theory is a very specific neo-Marxist environmental-sociological theory, and to see its principal characteristic as being Marxist or political-economic theory does little to "locate" it.

Actually, neither the early work of Schnaiberg nor the more recent work by the treadmill group has deep mainstream neo-Marxist roots. Most neo-Marxists, if they are actively aiming to have their work be recognized as such, will deal occasionally, if not repeatedly, with where they stand in the Marxist tradition. Thus, for example, Foster's (1999, 2000) works, and most every article in Ted Benton's (1996) *The Greening of Marxism,* have multiple references to Marx's primary works. By contrast, to my knowledge there is only one literature citation to Marx (to *The Communist Manifesto*) in *The Environment*, though *The Environment* did contain multiple citations to the work of Marxists such as Baran, Sweezey, Burawoy, and Braverman. Most recent works by the treadmill of production group, however, do not cite a single piece of Marx's original works. Occasionally, as in

[3] This problem is not confined to the treadmill of production. Most environmental sociologists tend to portray ecological modernization in a comparably oversimplified way.

Schnaiberg and Gould (1994), Marx is mentioned, but there are no citations to Marx's primary works, and few to major pieces of Marxist theory. This is not at all a criticism; it merely indicates the eclectic and synthetic nature of their work, and highlights the fact that the treadmill group does not see their work primarily as Marxist scholarship. In C. Wright Mills' (1962) terminology, they are definitely not aiming to be "sophisticated Marxists."

Second, some of the fault for the considerable misunderstanding of the treadmill of production rests on the shoulders of the authors. It has not been often that Schnaiberg, Gould, Pellow, and Weinberg have elaborated the notion of the treadmill of production at a length comparable to the treatment of the treadmill notion in Chapter V of Schnaiberg (1980). Despite an impressive volume of publications from the treadmill of production research group over the past decade, a scholar desiring a fairly comprehensive and recent treatment of what the treadmill of production will not have many choices. Other than *The Environment*, the main choices for a considerable elaboration of the theory are Gould et al. (1996) and Schnaiberg et al. (2002). Third, while Gould, Pellow, Weinberg, and Pellow have continually sought to "update" the treadmill of production notion, in so doing they have not been very systematic about what has been retained and what has been scrapped from the original version. Thus, they seem to imply that the continuities in the theory are much, much greater than the divergences. As I will note below, it is reasonable to debate this implicit assumption. Finally, over the past 15 or so years, Schnaiberg and colleagues have mainly undertaken work in which the treadmill of production is utilized as the contextual or framing notion (mainly for understanding the constraints on environmental movements and environmental mobilization), but they have not given very much attention to the macrosociological functioning of the treadmill per se. In the remainder of this paper I will want to make some contributions to addressing each of these misunderstandings and shortcomings of the treadmill of

production tradition that have led it to have less of an impact on environmental sociology than it should have had.

TOWARD NEW UNDERSTANDINGS OF THE TREADMILL OF PRODUCTION

The Treadmill of Production as a Distinctive and Specific Neo-Marxist Environmental Sociology

The notion that the treadmill of production represents environmental-sociological neo-Marxism is a not so much false as it is oversimplifying and misleading. One way to demonstrate this is summarized in Table 1. Table 1 contains a typology of eco-Marxisms. The typology has two axes. One of these axes concerns whether the theoretical centerpiece is explicitly or implicitly on nonfarm transformative industry (only), or whether the theoretical referent centers on *both* transformative industry and eco-regulatory, renewable, and extractive sectors or peripheries.[4] The second axis concerns whether the style of Marxism employed draws mainly from the young/philosophical Marx (Marx's works prior to 1845), from the mature Marx (which is dated variously from his 1852 essay on Bonapartism, from the writing of *Grundrisse*, or from the writing of *Capital*), or from the eclectic "plain-Marxist" tradition. It should be stressed that this typology is rough,[5] and neither axis or

[4] The former is based mainly on *Capital, Volume 1*, and the latter mainly on *Capital, Volumes 2 and 3* (in which forest depletion and agriculture/agronomy are discussed, respectively)

[5] For example, one could quibble with the young/mature/plain Marxist axis on a good many grounds. I myself, for example, think it is useful to think of the young Marx (works prior to 1845), the historical-materialist Marx (works from 1845 to roughly 1852), the "mature" Marx who stressed the economics of capitalism, and the "Late Marx" (the presumably more enlightened Marx who rejected the notion that "stages" and that socialism could emerge in the most developed capitalist formations, as depicted in Shanin, 1983). Then again, I respect the argument that the dividing up of Marx's work into stages serves to conceal the commonalities in his work over time. Further, the distinction between the focus on only nonfarn transformative industry versus consideration of both transformative and extractive sectors is to some extent a matter of degree. To wit, some members of the Schnaiberg et al. group have had a considerable interest in the rural sector, though others have not had this interest. But I believe most important consideration here is whether the extractive or eco-regulatory component of capitalism is actively and directly theorized.

dimension should be understood to draw invidious distinctions. For example, while my own taste is that stress on extraction and the eco-regulatory sphere makes for a more comprehensive model, others would take the point of view that the essence of capitalism is the enormous expansion of the scope of transformative nonfarm industry.

The conclusion I wish to stress from Table 1 is that the treadmill of production is a very specific type of eco-Marxism. I classify the treadmill of production as a variety of eco-Marxism that is anchored mainly in plain Marxism, and which theorizes the essence of a capitalist political economy as being constituted by the dynamics of transformative nonfarm industry. Thus, I believe it is a distortion when scholars see the theory of the treadmill of production as being essentially the same species as, for example, that of O'Connor's (1994, 1998) perspective on the second contradiction of capital or Foster's (1999, 2000) theory of metabolic rift. These are very different theories, with different problematics and/or explanatory schemes.[6]

The Myth of the Invariant Theory of the Treadmill of Production

I am continually surprised that so many scholars have taken the theory of the treadmill of production to have been a largely unchanging and static perspective. There actually have been a number of quite fundamental changes in the formulation of the theory of the treadmill since 1980. As noted earlier, I believe that the treadmill of production group has not said enough about the scope of and rationales for the quite substantial changes that have been made to the theory. I believe that for the theory to advance there is a need to have an explicit recognition of the

[6] Thus, for example, O'Connor's (1994) key problematic is to understand how environmental degradation manifests itself as crisis or contradiction (i.e., as the second contradiction of capital), while the problematic of the treadmill group is to understand how the relentless reinforcing processes of capital-intensive economic expansion create "additions" and "withdrawals," and, at the same time, highly constrain the movements that mobilize to redress these processes of environmental degradation.

considerable changes that have been made in the theory, and a discussion of why these changes have been made and what their theoretical, explanatory, and methodological consequences are.

In Table 2 I have made a start on this task by compiling a list of the major components of "the" theory of the treadmill of production. I have compared these components over time by drawing on three sources. First, the "original model" is taken to be Schaniberg's *The Environment* (1980). This book, it should be noted, contains the most detailed, sociologically sophisticated, and coherent account of the theory of the treadmill of production that has yet been published. The "recent model" depicted in Table 2 draws on two works: the Gould et al. *Local Environmental Struggles* book (1996) and the Schnaiberg et al. (2002) article. Taken together, these two pieces provide a level of detail about the new model of the treadmill of production that rivals the presentation of the original model in *The Environment*.

A quick scan of Table 2 shows that there has been very considerable change from 1980 to the late 1990s in the underpinnings of and the concepts used in theory of the treadmill of production. There are, to be sure, some very important continuities. The key claim remains that capital-intensive economic expansion is intrinsic to capitalist-market societies, due to the structure of the economy and the role of the state, and involves an intrinsic tendency toward environmental degradation. Some of the changes that are evident in a comparison of the original and recent models are more differences at the level of terminology than they are changes of real substance. Thus, for example, what was referred to as "growth coalitions" in 1980 is now mainly referred to as "treadmill organizations" in the most recent work. There is some subtle difference between the two notions; the first has an overtone of incorporating Molotch's (1976) concept of growth coalitions (which involves land-based real-estate, commercial, and other place-bound capitals in addition to industrial and finance capitals), while the latter seems to refer more specifically to industrial corporations, trade associations, trade regimes, finance capital, and so on.

In addition, there are a large number of changes from the original to the recent treadmill of production model that are of considerable theoretical significance. One set of shifts—toward a predominantly plain-Marxist approach, and toward decreased influence by O'Connor (in terms of both his work on fiscal crisis of the state and on the second contradiction)—has been noted earlier.[7] The new model of the treadmill of production involves a major shift in the units of analysis—from analysis centered on the national state and nation-state to one that focuses simultaneously on globalization and on localities and regions. Finally, as is most evident in Schnaiberg et al. (2002), there is a shift in intellectual adversaries, from neo-Malthusians to ecological modernizationists.

I recognize that there is room for argument about whether the new model is a fundamental departure from the original one. It is arguably a little bit of both. I would suggest, however, that the new model departs significantly from the old one in the shift of units of analysis and in the emphasis on globalization. At a minimum, Table 2 suggests that those who would claim or assume that the treadmill of production has been invariant over time have a burden of proof to attend to.

RETURNING TO OUR/THEIR ROOTS: TOWARD AN AGENDA FOR RESEARCH AND COMPARATIVE-HISTORICAL SOCIOLOGY OF THE TREADMILL OF PRODUCTION

It is my view that, to use an automobile repair and maintenance metaphor, while the treadmill framework is misfiring to some degree and is thus in need of 40,000 mile maintenance, the chassis and components remain in good working order. In the remainder of the paper I would like to sketch very briefly a agenda for how to undertake this major maintenance that this otherwise fine vehicle needs.[8] The place to start in this research agenda is to note that the theoretical model of the

[7] O'Connor (2002) makes some interesting and useful remarks on the original version of *The Fiscal Crisis of the State* about how the fiscal crisis model needs to be revised in light of globalization and financialization.

[8] The power of the treadmill of production as a social force is perhaps revealed in the fact that I have been unable to find a better metaphor—one that avoids glorifying capital-intensive accumulation and derived consumption practices.

treadmill of production has yet to be comprehensively updated at the level of detail and comprehensiveness reflected in Chapter V in *The Environment*. Not only should there be a new statement of the theory (in a single publication) at the level of detail contained in Chapter V of *The Environment*, but the treadmill group should also prepare their own take on what I have laid out in Table 2 and be explicit about the changes that have been made and their rationales.

Second, as important as it is for environmental sociologists to appreciate the opportunities and limits of contemporary environmentalism(s), my feeling as an environmental sociologist is that I would rather see the treadmill group attend once again to researching the macrosocial dynamics of the treadmill itself. Put somewhat differently, the considerable changes in the treadmill model reflected in Table 2 indicate that the authors recognize that the operation and dynamics of the treadmill at the turn of the century differ from those of nearly three decades ago when Schnaiberg's first major publication (Schnaiberg, 1975) on the topic was published. Put in an admittedly simplistic way, the treadmill perspective was anchored in a social reality and in a literature that were based on the model of a social-Keynesian, Fordist, quasi-social-democratic political economy. By the turn of the century these features of the American and international political economy had changed dramatically, in the direction of post-Fordism, neoliberalization and structural adjustment, financialization of national and global economies, selective dismantling of the welfare state, and so on (Arrighi, 1994). Given such massive changes in political-economic structure and dynamics, the treadmill has almost certainly changed in some important parameters. There has also been a wholesale industrial-technological transformation (from chemicals, "heavy industry," and so on to a much greater role of new information technologies and the financial services sector)[9] that suggests the need for more detail about the connections among political-economic structure, state policymaking, the character of economic expansion and accumulation, and the nature of

[9] Pellow's most recent work on Silicon Valley has begun to address this matter.

environmental degradation processes. Is the treadmill of production for all practical purposes a constant, or are its structuring and functioning contingent on a complex set of factors (class struggle, globalization, the changing character of technology) that can be better specified? I would like to see more research on how and why the nature of the treadmill has changed over, say, the entirety of the post-World War II period or during "the long twentieth century" (Arrighi, 1994). There is, in other words, a need for a comparative-historical sociology of treadmills of production within specific capitalist societies and within the historical world-economy.

A third part of the research agenda can be noted by saying simply that the treadmill conception of the environment ("additions" and "withdrawals," with no apparent weighting of the two) has not changed since the original Schnaiberg publications. Treadmill researchers need to revisit this conception in order to make improvements that incorporate space and time/history. There is also a need to incorporate better understandings of the social and ecological significance of various forms of environmental degradation. Two useful places to start are Scoones (1999) and Maurer (1999).

I would like to preface my discussion of the final portion of the proposed agenda by noting that there are now five major traditions in environmental sociology today: the treadmill of production and other eco-Marxisms, ecological modernization and other sociologies of environmental reform, cultural-environmental sociologies, neo-Malthusianisms, and the new ecological paradigm. Each major tradition is under considerable fire for one reason or another. The most dynamic of the newcomers has been ecological modernization, but more heavy intellectual artillery is now aimed at ecological modernization and related environmental reform perspectives than at any other perspective. In this anomic state of environmental sociology, there are certain alliances being formed, but they are often more so alliances of convenience than alliances of conviction. It is my view that the treadmill of production community at large ought to continue the

constructive engagement with what I have called the "sociology of environmental reform" (Buttel, 2003). The sociology of environmental reform, the branch of environmental sociology that takes environmental reform or improvement as its problematic or explanandum, has some commonalities with the treadmill of production (materialism, objectivism, and a skeptical view toward environmentalism). Both are prone to being oversimplified and misunderstood. The dialog begun by Mol and Spaargaren (2002) and Schnaiberg et al. (2002) has been useful for environmental sociology. There are also affinities among the treadmill of production, ecological economics, and political ecology on these matters, and these affinities need to be explored and pursued. More of this type of detailed dialog will be good for the treadmill of production enterprise and good for the subdiscipline as a whole.

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Table 1. A Typology of Eco-Marxisms, With Illustrative Exemplars.

Sectoral Focus/Foci	Which Marx? Young Marx	Mature Marx	Plain Marxism
(Transformative) nonfarm industry	Murray Bookchin Andre Gorz (social ecology)	James O'Connor (crisis- and second-contradiction-driven approaches)	Ken Gould, Allan Schnaiberg, David Pellow (treadmill of production)
Emphasis on both transformative industry and eco-regulatory, renewable, and extractive spheres	Peter Dickens (critical-realist eco-regulatory environmental sociology)	John Bellamy Foster, Stephen Bunker Ted Benton, Paul Burkett (political economy of town-country relations and of metabolism among industry, agriculture, and other extractive sectors)	Joan Martinez-Alier (political economy of extraction and industrial capitalism)

Note: The references include one or more citations to the works of the exemplars mentioned in the table.

Table 2. Evolution of Treadmill of Production Components and Arguments: From *The Environment* to *Local Environmental Struggles* and "The Treadmill of Production and the Environmental State"

Component	**Original Model** (*The Environment*)	**Recent Model** (*Local Environmental Struggles* and "The Treadmill of Production and the Environmental State")
Key claim	Capital-intensive economic expansion is deep-rooted, if not immanent in capitalist societies and is environmentally destructive	Capital-intensive economic expansion is deep-rooted, if not immanent in capitalist societies and is environmentally destructive
Capital intensity of industry	Capital intensity rises; leads to increased resource consumption and pollution	Capital intensity rises; leads to increased resource consumption and pollution
State social investment supports private accumulation	Major role	Major role
Key Terminology	"Production expansion" (mainly with reference to industry) "growth coalitions"	"Economic expansion" (more encompassing) "treadmill organizations and actors")
Version of neo-Marxism influence citations	Blend of a "sophisticated Marxism" (à la O'Connor) and "plain Marxism"	Mainly "plain Marxism" (less of O'Connor, and fewer to neo-Marxist literature)
Monopoly/ Competitive Sectoral Depiction of the Economy	Major role in the analysis	Absent from the analysis
Prevailing Rates of Profit	Vary by sector (highest in monopoly sector, but generally high overall)	Problematic to maintain
Working Class	Major role (stress on labor parties and working class parties)	"Worker-citizens'"(an atomistic grouping , only a force locally?)
Social-Keynesianism as state policy	Major role	Minor role
Growth of State Sector	Major Role	Minor role

Nature of the state transnation- over	Considerable autonomy	Heavily constrained by the al treadmill; role has diminished time compared to the role of "transnational treadmill actors"
Growth Coalitions organ-	Major role	Modest role; renamed "treadmill izations"
Unit of Analysis	Nation-state, national state	National and transnational
Local growth promo- tion	Minor role	Major role
Welfare-state con- tributes to expansion	Major role	Minor role
Growth promotion Ideology	Significant (but there is an "un- politics of expansionism")	Major role
Economic growth/ accumulation is problematic	No	Yes
Internal contradict- tions (e.g., accumula- tion-legitimation) within state policy	Major role	A lesser role
Transnational forces	Minor role	Major role
Conception of the Environment	Additions/withdrawals	Additions/withdrawals Sustainability/unsustainability
Environmentalism	Crucial force, but subject to trivialization	Crucial force, but overwhelmed by transnational and local treadmills and undermined by commodification
Intellectual Adversaries	Neo-Malthusians	Ecological modernizationists
Nature of Crisis through	Fiscal crisis, underconsumption	Treadmill is speeded up trade liberalization and transnational- ization; the ratio of victims to beneficiaries increases.
Victims of the up" Treadmill	The poor, unskilled, working class	The ranks of victims have "moved to include the middle class—even middle- or upper-level managers.
Role of finance	Important role of the state in	"Portability" and "circulation speed"

edge	providing credit	of private finance capital, leading of transnationalization