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Articles

THORSTEIN VEBLEN

Pioneer in Environmental Sociology

ROSS E. MITCHELL
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This article investigates the writings of American institutional economist Thorstein Bunde Veblen (1857-1929) on capitalism and environment. The two main queries concern (a) Veblen’s stand on natural resource utilization as a consequence of capitalism and (b) its current relevance to environmental sociology. Veblen’s theories of conspicuous consumption, absentee ownership, and natural resource exploitation are examined from several of his seminal contributions. The article concludes that Veblen’s pioneering analysis of wasteful use of natural resources and emulative consumerism is essential to environmental sociology and timely because of current environmental crises. Future research is suggested in two areas: (a) applying Veblen’s theoretical approaches to the ecological aspects of capitalism and (b) comparing Veblen with other classical theorists such as Marx and Weber within the subfield of environmental sociology.

Growing up on a Norwegian homestead in America during the 19th century may not seem like good fodder for scholarly achievement. Then again, the frontier lands of America may have been the perfect staging ground for the institutional economist Thorstein Bunde Veblen (1857-1929). Undoubtedly, his pioneering background in the backwoods of northern Minnesota had an influential effect on all he valued and abhorred in society. The indefatigable Veblen was never far removed from his homesteader roots. Like a true pioneer, he broke new ground in capitalistic and institutionalist theory, yet he continues to be misunderstood and misinterpreted by both critics and admirers.

Veblen (1899/1967b) is renowned for his classic The Theory of the Leisure Class: An Economic Study of Institutions (hereafter TLC). With characteristic aplomb and sardonic wit, Veblen’s principal methodology was an application of Darwinian notions of evolution to the study of modern economic life. His prescient analysis of capitalism and society arguably ranks him alongside Karl Marx, Émile Durkheim, and Max Weber. As a “rebel economist (or sociologist) of the left,” he was deeply influenced by the works of Marx, although he was no Marxist (Foster & Szlajer, 1984, p. 13). Regrettably, his critical-sardonic take on American big business at the turn of the 20th century, when industrialization was in full throttle, and...
an academic career beset with controversy have often sold Veblen short of his fair
due of recognition. Above all, many have failed to recognize how Veblen (1923/
1967a) so astutely situated environment and society, or his habitually mentioned
“American Plan of seizure and conversion . . . [and] of hurried exploitation instead
of economical use” (pp. 186-188).

Veblen (1899/1967b) argued that all modern materialism can be reduced to
waste by nonproductive consumption of time and visible displays of wealth, or
what he called “the great economic law of wasted effort” (p. 83). As a result, some
scholars have asserted that Veblen regarded resource scarcity problems as coupled
to societal needs, industrial shortcomings, and/or business manipulations (e.g.,
Baran & Sweezy, 1966; Barkley & Seckler, 1972; Bell, 1998; Boles, 1998; Com-
moner, 1971; Foster, 1994; Gould, Schnaiberg, & Weinberg, 1996; Hughey &
Szrajfer, 1984). Still, as demonstrated by the mid-1960s publication of Monopoly
Capital: An Essay on the American Economic and Social Order (Baran & Sweezy,
1966), with its Veblen-like critique of waste due to capitalism, the socio-
environmental aspects of Veblen’s work have been most fully appreciated and
developed within radical and institutionalist economic traditions in the United
States. This reflects the fact that Veblen has been more influential within economics
than sociology. Certainly, these deep-seated traditions overlap with sociology, but
until now, no comprehensive attempt has explored Veblen’s relevance to the
subfield of environmental sociology.

Recognizing that humanity has become increasingly reliant on the wasteful use
of resources to meet the North’s insatiable need to consume, I argue in this article
that Veblen’s writings offer precious insights on the role of humanity in both caus-
ing and exacerbating global environmental crises. By positioning Veblen along
these lines, my contention is that we can acquire a classical perspective to improve
our understanding of the critical hub linking environment and society.

To begin, environment not only represents the integration of living (biotic) and
nonliving elements in the environment; it is also the locus of all material support of
humanity (Schnaiberg, 1980). Environment not only embraces the physical world
and its natural resources, such as forests, land, air, and water; it implicates human
interventions and impacts as well. Ultimately, environmental crisis is inevitable
because pollution and consumption of energy and raw materials can be controlled
and restrained, but not completely avoided (O’Connor, 1988).

Environmental sociology, then, was conceived as a criticism of conventional
sociology for its lack of attention to the physical-biological-material bases of
human existence (Burch, 1971; Catton & Dunlap, 1978; Humphrey & Buttel, 1982;
Murphy, 1994; Schnaiberg, 1975). Environmental sociology as a distinct discipline
derged from the environmental movement of the late 1960s and began to appear in
mainstream sociological journals in the 1970s (Dunlap & Catton, 1979, 1994;
Humphrey & Buttel, 1982; Krogman & Darlington, 1996). Although many envi-
ronmental sociologists remain critical of society’s ability to address environmental
dilemmas, most do not reject capitalist economic or democratic political systems in
their search for alternative solutions to such problems (Humphrey & Buttel, 1982).
Even more troubling is the assertion that the classical sociology tradition is devoid
of systematic insights into environmental problems. Contrary to this view, recent
work has indicated how much we can learn by applying classical foundations to
contemporary environmental sociology (e.g., Boles, 1998; Buttel, 1996; Dunlap,
1997; Foster, 1999; Gimenez, 2000; Murphy, 1994, 1996; Vaillancourt, 1995).
Whereas Marx achieved widespread popularity, Veblen’s notoriety as a radical critic of American capitalism and unconventional academic has continued to marginalize his theoretical contributions long after his death in 1929. During the early to mid-20th century, Veblen’s influence was undeniably evident on such great political and economic thinkers as Harold Innis, Wesley C. Mitchell, John R. Commons, John Kenneth Galbraith, K. William Kapp, Paul Baran, and Paul Sweezy. All of these credit Veblen to some extent in having helped formulate their heretical perspectives. But, what of more recent sources on the theory and practice of environmental and natural resource sociology? As a critical theorist of conspicuous consumption and wasteful extractive processes of natural resources, it is odd indeed that Veblen has rarely been cited within the environmental sociology subfield. Several sources in this subfield include foundational works by Bell (1998); Buttel, Larson, and Gillespie (1990); Dunlap and Catton (1994); Field and Burch (1988); Metha and Ouellet (1995); Redclift and Woodgate (1997); and Schnaiberg (1980). Although many consider Durkheim, Marx, and Weber for their potential contributions to environment and society, Veblen is given short shrift—either downplayed or ignored entirely.

Veblen’s critical thought vis-à-vis wasteful and exploitative practices of capitalism is evident in works such as TLC (1899/1967b) and The Theory of Business Enterprise (1904). Although both achieved critical acclaim, or unfavorable reviews in some circles, Veblen’s (1923/1967a) last book, Absentee Ownership and Business Enterprise in Recent Times: The Case of America (hereafter AO) has been largely overlooked. With several chapters on the exploitative use of natural resources, AO is a penetrating account of all Veblen found wrong with the American economic system; above all, uses of property “that were speculative, unproductive, wasteful, and/or exploitative” (Vaughn, 1999, p. 716). In AO, Veblen bore witness to an age of great industrial expansion and unbridled optimism as the “taming” of the great western frontier came to a close. His account of natural resource scarcity and waste that had begun to plague America by the mid-19th century was remarkably prophetic. So why have Veblen’s writings within the subdiscipline of environmental sociology been mostly ignored or underestimated until now?

Difficult to pigeonhole and harder still to interpret, the enigmatic Veblen has been categorized as a maverick, a radical economist, a philosophical radical, an American Marxist, a social reformer, even an artist! But, what he accomplished and may still offer us by way of broadening our understanding of human society goes far beyond any such labels. Veblen urged his students to dispute what was considered etched in stone. His essay on the scientific aspects of modern civilization proclaimed the elementary truth that one only knows something by the questions that have been asked (W. Hamilton, 1958). Veblen (1919/1990) also once wrote, “the outcome of any serious research can only be to make two questions grow where only one grew before” (p. 33). Consequently, I make two principal queries in this article: (a) How did Veblen explain the capitalistic mechanisms of American industrial and agricultural society as relevant to natural resource utilization? and (b) Can Veblen’s work offer any insight to contemporary environmental sociology? After examining Veblen’s (1923/1967a) examples of natural resource exploitation in AO, I discuss some 20th-century writings on environment and society to illustrate how Veblen influenced and even inspired their respective views. I conclude by suggesting environmentally relevant research that would benefit from Veblen’s theoretical guidance.
VEBLEN’S THOUGHT ON
SOCIETY AND ENVIRONMENT

This section addresses the first question posed in this article, namely, How did Veblen relate capitalism to environmental issues? I explain three principal constructs to illustrate Veblen’s understanding of the relationship between environmental exploitation and capitalism: (a) predatory-industrial class distinction; (b) social-psychological concepts of conspicuous consumption, conspicuous leisure, and conspicuous waste; and (c) absentee ownership. I stress that Veblen’s treatment of a consumer-oriented society based on reckless waste by profit-hungry corporations underpins the root causes of environmental degradation and pollution, a premise even more applicable in today’s global context of rapid environmental and socioeconomic change. If this is what concerns environmental sociology, then Veblen represents a vitally important and largely untapped resource.

The Predation of Labor

Overall, Veblen conceptualized society as materialistically grounded, class-divided, and evolutionary in form. As elaborated in TLC, Veblen (1899/1967b) believed that societal development depended on the growth of technical knowledge and the use of tools, with an emergent fundamental distinction between two classes of persons: the industrious class (or workers) and the predatory class (also the pecuniary or business class). Veblen’s industrious class is composed of those who engage in productive activity, which he held to include manual craft and machine-aided labor, engineering work, and the technical organization of labor. Workers, engineers, and technicians produce the actual wealth (the useful goods) of modern society. In contrast, the predatory class is made of “parasitic” business members living off the innovation and productiveness of the rest of society. Veblen asserted that such persons do not produce anything of benefit to the well-being of society; instead, they rely on competitive manipulations to maximize their own personal wealth and hinder the coordinated running of an advanced industrial society. To further distinguish these two classes, Veblen considered the industrious class as the bulk of society’s population, whereas the predatory class forms a numerically smaller, privileged, upper-class segment including business owners, politicians, lawyers, accountants, and managers.

Hence, Veblen’s predators are commensurate with Marx’s bourgeoisie or capitalists, John Kenneth Galbraith’s new class, and Joseph Schumpeter’s entrepreneurs. Veblen felt that the business class began to engage in predatory behavior most acutely in the 19th century, when exploitation of human and nonhuman factors became paramount in the name of “industrial efficiency.” For Veblen, a predatory life is possible only after technology has advanced enough to create a surplus beyond what is required for sustenance. Moreover, Veblen (1898) claimed that the “instinct for workmanship” is the most important sense for collective well-being. Yet, workmanship pride was being perverted by the rise of pecuniary interests—essentially, the birth of corporate America.

For Veblen, then, industry was viewed as the production of useful wealth and business as the accumulation of profit. Moreover, the endeavor of all business enterprises that look to a permanent continuance of their interests is to establish a monopoly (Veblen, 1904, chap. 3). This monopoly position may be a legally established one or based on comparative advantage due to a privileged location or control of natural resources. In any case, the motivation was essentially the same: market
domination and profiteering to the detriment of what Veblen referred to as the “underlying population,” or mainstream society. Veblen believed that the increasing separation of financial (business) and technical skills would end in competitive business manipulations and eventually produce an unprecedented economic collapse. To a great extent, then, Veblen predicted the Great Depression, which would follow his death by only a few months (Ashley & Orenstein, 1998). His criticisms of monopoly control of societal institutions and mechanisms would be later taken up by authors such as Baran and Sweezy. As I will show in the following section, the exploitation and waste of natural resources was described and theorized by Veblen in his critique of the “American plan” of resource utilization.

Consumption and Waste

In *TLC*, Veblen (1899/1967b) maintained that a large part of people’s behavior, especially patterns of consumption and leisure, could be explained by individual struggles for high standing. By conspicuous consumption, Veblen asserted that the wasteful consumption of wealth (i.e., consumable goods) is held to be a symbol of high status that typifies the upper, predatory class. He defined conspicuous leisure as those who spend their time by not engaging in any sort of productive or socially beneficial work. Veblen regarded conspicuous waste as an amalgamation of conspicuous consumption and conspicuous leisure, postulating that they are two forms of the same social phenomenon (namely, both involve a socially nonproductive waste of time and effort).

Veblen (1899/1967a) felt that goods are used by society in two ways: to satisfy conspicuous consumption (waste) and to achieve some end purpose. His expenditure test of “goodness” is “whether it serves directly to enhance human life on the whole—whether it furthers the life process” (p. 99). Consumption and leisure, then, induce lower status individuals to increase their social status by emulating those displaying obvious signs of wealth. As sociologist Robert Merton indicated, “the Veblenian paradox is that people buy expensive goods not so much because they are superior but because they are expensive” (quoted in Tilman, 1991, p. 176). Burdened with the mark of conspicuous consumption, style and fashion lose touch with function. Envy and emulation motivate consumption, and their continuance maintains the domination of the upper, predatory classes. Yet, such behaviors demonstrate the near total irrelevance of healthy and equitable economic growth capable of providing the material means of life for all community members to share.

Veblen (1923/1967a) was also one of the first to write on advertising and marketing as symbols of contemporary aspects of capitalism. Marketing became the new “Propaganda of the Faith,” only less efficient as he described religion and salesmanship in *AO* (see chap. 11, “Manufactures and Salesmanship”). The end result of the development of new sales techniques was to powerfully encourage consumption and waste. Even the sheer volume of waste (raw materials, labor, and equipment) being generated by newsprint publicity to entice the masses did not pass Veblen by:

It is, accordingly, scarcely an over-statement to say that something like one half of the wood-pulp that goes through the paper mills, together with one-half the manpower and mechanical equipment engaged in the paper industry and the printing trades, is consumed in the making of competitive sales, the net effect of which is to raise the prices paid for goods by the consumers. (p. 317)
Marketing and advertising were also the institutional mechanisms that connected Veblen’s writings on the leisure class to the middle classes. Its cultural mechanism is the absolutely decisive significance of emulation, which is central to Veblen’s understanding of how society works. The middle classes and working classes emulate the honorific waste and consumption styles of the upper classes so that waste and consumption broaden out from the leisure classes to become a defining feature of the whole culture of capitalism, not just of its leisured strata (M. W. Hughey, personal communication, July 10, 2001). The importance of emulation also frames Veblen’s underdeveloped conception of political power. That is, he thought emulation was so effective at keeping the other classes in line that state coercion was less necessary.

By waste, at least in the context of TLC, Veblen (1899/1967a) was not referring to pollution and refuse generated from industry and other human activities (i.e., the “externalities” of modern economics); rather, he was referring to economic inefficiencies and societal consumptive patterns. To Veblen, inefficient use of natural resources meant that their full potential for human use was unsatisfied. But, we should not injudiciously characterize Veblen’s contribution as a simple gospel-of-efficiency approach to conservation (ignoring issues of ecological degradation and the intrinsic value of nature) for two reasons: (a) Although pollution was a major problem in the 19th century in industrial centers such as Chicago, it was still behind the scope of extensive damage that would typify the late 20th century (e.g., consider the 1987 Chernobyl nuclear plant explosion and the 1989 Exxon Valdez oil spill off the Alaska coastline); and (b) Veblen’s critical discourse of conspicuous waste, leisure, and consumption as immaterial status symbols, and of resource scarcity caused by corporate and state wastefulness, makes an important contribution to the critique of ecologically damaging capitalism. As we shall see in the next section, waste of natural resources was a principal concern for Veblen.

The Exploitation of Natural Resources

Veblen’s (1923/1967a) considerable familiarity of natural resource exploitation is perhaps best manifested in AO, his last work, which has been virtually ignored by environmental sociologists. Several relevant arguments to this article presented in AO, for example, are land expropriation by absentee owners, wasteful natural resource extraction, and rapid deterioration of the productive land base. Examples of natural resource utilization discussed at length include the fur trade, gold mining, the coal and steel industries, timber extraction, waterpower, and crude oil exploration and production. Throughout AO, Veblen severely criticized lumbermen, oil producers, and other “Captains of Industry” who in accordance with “sound business principles” carried out dubious practices of “seizure and conversion,” “land-grabbing,” “disemboweling resources,” and “waste and destruction.” Veblen held that “absentee ownership has become the master institution in American civilisation” (p. 119). Such absentee ownership was established not by virtue of workmanship “but on the ancient feudalistic ground of privilege and prescriptive tenure, vested interest, which runs back to the right of seizure by force and collusion” (p. 51); in short, by those who did not rightfully own the land but nonetheless exploited natural, material, and human resources (or land, capital, and labor) for financial gain.

Veblen accused “predatory” businesses of not bearing their share of environmental costs because of their “business as usual” rationale. Those who acted in self-interest especially incensed him (e.g., speculators, profiteers, or even cash crop
farmers more preoccupied with real estate values and collusive arrangements than food production). Such preoccupations as Veblen described have continued to motivate commercial farming operations, more so now than ever; for example, export “luxury” crops such as coffee and tea in many tropical countries and large-scale hog or poultry operations of the American Midwest.

The End of the Frontier

Not only pioneering in his prescient articulation of production and consumption societal interstices, Veblen was a pioneer in the true sense of the word. Raised in a farming community of northern Minnesota under the influence of his Norwegian carpenter father Thomas, Veblen was personally familiar with the agricultural and forestry practices of his day.

The frontier expansion as Veblen described it was essentially a seizure of specific natural resources for pecuniary ends. Veblen was incensed that the country’s abundant natural and public resources were being deliberately exhausted on the opportunistic principles of “sound business” as laid out in the American plan. For example,

[Absentee ownership] is not particularly American, except in the sense that it has been worked out more consistently and more extensively here than elsewhere, and that it has been worked into the texture of American life and culture more faithfully. . . . This American plan or policy is very simply a settled practice of converting all public wealth to private gain on a plan of legalised seizure. (Veblen, 1923/1967a, p. 168)

As Veblen noted, the first natural resources to fall under this plan were the furbearing animals. Veblen must have witnessed the last stages of this depletion of wildlife resources, which once formed the basis of prosperous industries (Kapp, 1963, p. 139). Veblen (1923/1967a) felt that the fur trade, “now a scarce-remembered episode of pioneering enterprise,” was ruined by business interests “with exemplary thoroughness and expedition and has left the place of it bare” (p. 168). The once abundant “community goods” had been squandered away without heeding the ensuing social or ecological consequences: “but the Americans have forgiven themselves for the fur trade and its hideous accessories and have nearly forgotten it all” (p. 169).

After the “despoliation” of wildlife for the fur trade came the taking of gold and other precious minerals, according to Veblen, followed by the confiscation of timber, iron, other metals, oil, natural gas, waterpower, and irrigation rights. Modern industry came of age, of which Veblen distinguished three classes: key industries, manufactures, and farming. Key industries for Veblen were coal, steel, oil, lumber, waterpower, or other operations that rely on natural resources. Perhaps in the common parlance of his era, Veblen included means of transportation (e.g., railways, rights-of-ways, and harbors) in his definition of natural resources.

Forest Exploitation

In the chapter entitled “The Timber Lands and the Oil Fields,” Veblen (1923/1967a, pp. 186-201) outlined the historical development of the lumber industry to illustrate “how absentee ownership functions in taking over the country’s natural resources and uses them up” (p. 187). Veblen deplored the destruction of the eastern
and Midwest forests of America in the expeditious pursuit of net gain by “enterprising” lumbermen. As Veblen described it, most of the evergreens east of the plains (i.e., pine, hemlock, spruce, and cedar) were “run through and virtually exhausted during the latter half of the nineteenth century” (p. 188). Veblen felt the production of lumber more than any other natural resource exemplified “how absentee ownership functions in taking over the country’s natural resources and using them up” (p. 187).

Attesting to his pioneering background, Veblen’s (1923/1967a) use of forestry-related terminology was highly specialized. Veblen explained how “waste products” were increasingly turned into usable goods as technology developed. Veblen also felt that shortsightedness in viewing the timber lands as inexhaustible had led to the destruction of the biggest (or most economically valuable) and accessible tree species. Citing the example of “the pineries of Michigan, Wisconsin, and Minnesota,” Veblen described how the lumbermen would take out only the marketable, large diameter grades of pine timber, leave the slashings (unwanted woody material) on the ground, and wait 2 or 3 years for the material to dry. Then, either by accident or intentionally, the land would be burned and any remaining timber destroyed (pp. 189-190). Veblen observed that fires from logged-over areas would frequently spread into nearby forests, wiping out more than half of the original stands of timber.

Veblen (1923/1967a) also blamed “independent farmers” (or pioneers) for their part in the forest destruction. Driven by their “nearly penniless” situation, they would hastily fell stands of hardwood timber in “half-wild country . . . far out of reach of reasonable transportation,” burn the timber, and sell the ash, which was later converted into potash (p. 188). As Veblen stated, “they took this way out of present [financial] difficulties at the cost of the future; and the future, which has now become the present, is paying the cost in a scarcity of timber” (p. 188). This perceptive concern was a forerunner of the current sustainable development thrust, which has become so widely touted by trade proponents and mainstream environmentalists alike. By denouncing fraudulent and wasteful logging practices, Veblen stated the case for a judicious utilization of forest resources. Hence, Veblen was an early advocate of sound forestry stewardship, a tribute to his small-scale farming and forestry experience.

More than anything, Veblen (1923/1967a) decried this uneconomical use of forested stands using “dubious practices . . . carried through at the cost of the community at large” (p. 189). Veblen indicated that “this enterprise of the lumbermen . . . has destroyed appreciably more timber than it has utilised,” although he added that better logging and milling practices were being employed at the beginning of the 20th century, evidence of improved technological and management expertise (p. 190). To be sure, Veblen exonerated the lumbermen somewhat by stating “none of this passionate endeavor to get rich quick has been willfully [italics added] destructive” (p. 191). Yet, Veblen accused the lumbermen of not only materially profiting from the timber exploitation but also gaining enhanced prestige and power through fraudulent means if need be: “[Many] find their way into the federal senate, sometimes even at a cash outlay . . . and have honorably kept faith with all the vested interests” (p. 192).

Veblen (1923/1967a) also elaborated how corporate interests with government support expropriated land resources. As he noted, “there was a shady side to some—quite a large proportion they say—of the transactions involved in so acquiring title to these timber-lands or to the stand of timber on them” (pp. 188-189). Still, Veblen allowed that “this somewhat prevalent shady complexion of the enterprise”
was less malicious than what was actually done to the land itself in the rush for profits (p. 189). Interested individuals and corporations, and large absentee owners in particular operated under a concerted plan of seizure and conversion to gain control of the remaining timber stands. As Veblen stated,

Under this American plan of expeditious seizure and conversion to private ownership, the spectacularly wasteful competition among enterprising pioneers has now run its course and has worked out in a system of collusive management in behalf of these larger absentee owners who have acquired title to (virtually) all that is left. (p. 193)

Monopolistic efforts served to secure title to landholdings as the lumbermen collectively waited for an eventual rise in lumber prices before converting the trees to valuable timber. Inefficient resource use, collusive management, and tariff protection were all designed to drive up lumber prices and hence profits. Veblen (1923/1967a) maintained that what remained after logging by absentee owners would cost society dearly, whereas it should have been managed “on a plan of deliberate economy and conservation from the outset” (p. 193).

Other Natural Resources

Veblen (1923/1967a) wrote that what transpired with other natural resources did not substantially differ from the case of America’s timberlands; “these others, too, show the characteristic traits of the American plan—initial waste and eventual absentee ownership on a large scale and on a quasi-monopolistic footing” (p. 194). Veblen indicated that coal, iron, and waterpower had already reached a reasonably settled state “of collusive management under corporation control on a basis of unqualified absentee ownership,” and the extraction of crude oil, “resembling the earlier lumbering enterprise,” was already “marked by a headlong competitive rush to disembowel the available resources expeditiously at any cost” (p. 197). In many ways, Veblen’s satirical description of natural resource use for capitalistic ends approximates Marxian notions of industrial bourgeoisie exploitation of land and raw materials into surplus value.

Veblen (1923/1967a) also described the plight of American farmers as being manipulated by “background vested interests” (p. 133).

Veblen’s main criticism of farmers was their often wasteful agricultural practices to satisfy pecuniary interests. Simply, modern farmers were caught between merchants who paid them little for their agricultural produce but sold to unwary consumers at inflated prices. According to Veblen,

the margin of benefit that comes to [the modern farmer] from his work is commonly at a minimum. He is commonly driven by circumstances over which he has no control, the circumstances being made by that system of absentee ownership. (p. 130)

For Veblen (1923/1967a), then, large agricultural holders were also absentee owners; by investing in their own farms, they believed themselves to have vested interests in their earning capacities. Veblen asserted that farmers tend to acquire more land than they can afford and maintain, with negative economic, social, and environmental impacts. Traditional values of teamwork, workmanship, and community spirit were being replaced by pecuniary interests. Modern farming methods
were run “on such a scale that no individual owner can carry on by use of his own personal work alone” (p. 131). In short, Veblen was concerned that the interdependence of farming areas and country towns magnified speculation in the rural economy, in turn fueled by increasingly available credit. He lamented that the oversupply of agricultural land would drastically reduce farmland prices and lead to farm foreclosures and bankruptcies during times of recession. Such a scenario was to be borne out during the dust bowl era of the 1930s and again during the 1980s in America’s Midwest.

Technology and Nature

At first glance, Veblen’s (1923/1967a) views on natural resources and technology seem to contain some striking inconsistencies with the preceding analysis on waste and exploitation. Notably, Veblen felt that natural resources are valuable as a social construct because society is willing to pay for their use. For instance, in his chapter “The Technology of Physics and Chemistry,” Veblen spoke of natural resources (including timber, coal, oil, and ores) as constantly increasing as a result of improved technical knowledge. He observed that rapidly evolving technologies had brought new tools, designs, and processes to make better use of natural resources, such as more efficient cutting methods in sawmills. In praise of technological advances, Veblen maintained that natural resources are resources, not merely features of the landscape, “because the technicians know how to turn them to account” (p. 272); in fact, so much so that by the early part of the 20th century, Veblen claimed that the technicians had become a standard factor of production.

Still, his faith in technology did not stop Veblen (1923/1967a) from severely criticizing those who applied it irrationally, inefficiently, or even unjustly. In the haste to exploit the nation’s crude oil and gas, for instance, Veblen complained that the “wild-cat” enterprises of large absentee corporations operating on a “shoestring” budget were ill prepared and undermanned (pp. 198-199). Lacking “competent technical advice and experience,” the petroleum industry was yet another example of “the vested interests that move in the background” (p. 199). It was not technology in itself to be held responsible for the misuse of natural resources. Veblen blamed the (mis)management of industry in which business owners shed all responsibility “for any derangement, waste or unemployment which this ‘safe and sane’ business practice entails on the rest of the industrial system” (p. 277). In essence, greedy profiteers distorted the sound application of technology, wasting productive labor and natural resources in the process.

What Veblen can add to our understanding of the use of technology is a more critical approach to industrial and bureaucratic management. He believed engineers and technicians, with their greater knowledge of industrial processes, to be intrinsically more adept at the “business” of production. Evidence of this technical ingenuity in modern times to reduce waste and hence increase production efficiency includes state-of-the-art waste treatment facilities, bioremediation, and other “environmentally friendly” techniques. Veblen bemoaned that businessmen, accountants, and managers of money had displaced the engineers and others proficient at producing goods. Nineteenth-century cultural values of pragmatism, thrift, industriousness, and productive efficiency gave way to a system of accountancy resting on salesmanship, speculation, and loan credit. In short, fine workmanship and stewardship of natural resources were cast aside during the “successful” emergence of monopoly capitalism.
Additionally, as much as Veblen (1923/1967a) advocated modern technology, there is no denying his strong convictions in the sustainable use of natural resources for the enjoyment of future generations. Veblen insisted that natural resources could not be managed in any sort of sustainable way if the land continued to be senselessly exploited by avaricious land barons. For example,

The natural resources of America are, or have been, unexampled in abundance and availability, and they have always been the main factor on which the life and comfort of the inhabitants have depended. . . . What stands in the way of this material good fortune, immediately and directly, is the absentee ownership of these natural resources. (p. 124)

Veblen’s views on natural resources as having to serve some productive end to be useful to society would undoubtedly be well appreciated by contemporary resource-dependent communities. Also, as demonstrated in this section, Veblen foresaw problems associated with the wanton destruction of natural resources, which eventually leads to scarcity and possible elimination if appropriate (albeit technical) measures are not taken. If Stephen Tyler (1999) was right in claiming that there are no more resource frontiers, and the emphasis has shifted to technological solutions, Veblen would have wholeheartedly concurred, as long as such solutions were linked to small-scale and needs-based production and consumption as opposed to the exploitative control of state-sanctioned profit mongers.

VEBLEN’S INFLUENCE ON CAPITALISM AND ENVIRONMENT

In Veblen’s historical treatment of the rise of capitalism, wealth, and property represent not only reward for labor and savings but predation and exploitation on labor and land alike. Veblen claimed that this was not only due to predacious business opportunists and profiteers but also to the proclivity of the North’s “leisure” and middle classes to engage in extravagant consumerism. But, Veblen also foresaw that the working class, or “underlying population,” as he preferred, would attempt to emulate the wasteful habits and symbolic trappings of the middle classes. False conscientiousness rears its ugly head, with “invidious consumption” as its progeny.

As pointed out in the introduction, Veblen’s most significant influences have been in ecological economics rather than environmental sociology. For example, Harold Innis (1894-1952), a former University of Toronto economics professor and an early follower of Veblen dating to when the latter was at the University of Chicago, studied North American natural resource–based industries: the fur trade, cod fishing, and the pulp and paper industries. Innis (1929) felt that Veblen’s influence on economic theory was a result of the frontier, “but it was the frontier of the industrial revolution which influenced his thought and not of American agriculture” (p. 59). In The Fur Trade in Canada, Innis (1930) was less critical of the fur trade than Veblen, who felt that this period was representative of the predatory conversion of public resources for private gain. Veblen (1923/1967a) felt the fur trade “was an unwritten chapter on the debauchery and manslaughter entailed upon the Indian population of the country,” a rotten business so distasteful that it produced “the sclerosis of the American soul” (pp. 168-169).

Veblen’s theories apparently also influenced multiple-use land management during the New Deal policies of the U.S. federal administration. One of Veblen’s
students, Claud Franklin Clayton, was a leading figure in the U.S. Department of Agriculture during the formative years of research on land economics up to World War II (Vaughn, 1999). Clayton contributed to planning and overseeing the U.S. Resettlement Administration’s submarginal land-utilization program of the 1930s. Vaughn described a Maryland project launched by Clayton in 1935 as evidence of Veblen’s multiple-use concepts to improve efficiency and reduce waste. The project demonstrated that wildlife management is compatible with forestry while enhancing scenic beauty, outdoor recreation, and opportunities for environmental education (Vaughn, 1997, as cited in Vaughn, 1999).

Other authors on industrialism, modernization, and consumerist behavior have borrowed from Veblen. Undoubtedly adopting both Marxist and Veblenian thought, ecological historian Christopher Vecsey (1980) asserted that American wealth has depended on the colonization of Native Americans to raise capital for industry and transform nature. In the same volume, Wilbur Jacobs (1980) identified several reasons for environmental problems faced by modern society, of which at least three appear to draw on Veblenian ideology. Firstly, the competitive exploitation of nonrenewable natural resources (such as oil, gas, and minerals) has greatly exceeded the extent to which this natural wealth has been sacrificed to meet societal demands (i.e., by states, industry, and consumers in the name of “progress”). Second, recognizing that American (and other) pioneers from the earliest times wasted resources too, both the overall quantity and the cumulative impacts of environmental degradation have intensified and caused permanent damage in many cases. Third, the state has had an increasing role in environmental despoliation because of its links with predatory business interests and scientists. In Veblen’s (1923/1967a) words, “in the last analysis the nation remains a predatory organism, in practical effect an association of persons moved by a community interest in getting something for nothing by force and fraud” (p. 442). Jacobs (1980) also noted that Veblen was an eyewitness to wasteful farming practices and to business domination of government in his analysis of America’s 19th-century dilemma and praised his advanced understanding of environmental social costs (p. 56).

Veblen also greatly influenced the pioneering social ecologist James Rorty, stemming from their brief friendship when Rorty took Veblen’s classes at the New School for Social Research in New York City (Boles, 1998). Rorty based much of his analysis on Veblenian principles, especially on capitalistic waste and inefficiency. Like Veblen, Rorty’s social criticisms included how the profit system inhibits the formation of an ecologically sustainable society, the problems of an advertising-controlled media, and how capitalism distorts the efficient use of technology (Boles, 1998). Again in pure Veblenian fashion, Rorty felt the advancement of technology necessitated a corresponding change and reorientation in social institutions (Boles, 1998). Yet, there are some major differences in their respective views. Chiefly, Veblen’s (1921/1933) brief emphasis on engineers as leaders of a new society in The Engineers and the Price System had all but disappeared in his gloomy outlook for American capitalism as substantiated throughout AO (1923/1967a), from which he could see no escape. In contrast, Rorty moved away from a theoretical position critical of capitalism and technology in his later years. Yet, his recognition that “ecological problems are social problems” was as relevant then as now (Boles, 1998, p. 155), to which Veblen would have most likely concurred.

Remarkably, not one of these illustrations of Veblen’s approach to capitalism and environment originates from the academic realm of environmental sociology. Instead, his epistemology is usually situated within environmental economics or
Veblen argued that . . . because of your wealth and position, you do not have to engage in productive activities yourself. You can command the environment through your command of other people, a command made possible by wealth and social position. Environmental power thus indicates social power. (p. 44)

Still, while providing a commendable synopsis of one of Veblen’s principal beliefs (i.e., conspicuous consumption), Bell (1998) fell short of extending Veblen’s ideological thought on societal materialism to cutthroat and exploitative corporate practices and government complicity. In the process, a grand opportunity is missed to infer a production-consumption relationship in genuine Veblenesque fashion; the supercilious statesmen, manufacturers, and merchants so adroit at exploiting consumers and resources. Also, the singular reverence aimed at TLC (Veblen, 1899/1967b) is typical of most sociological discussions of Veblen. Most analyses tend to disregard his separation of industry and business, for instance, or how large corporate interests employed advertising and credit to their pecuniary advantage.

Allan Schnaiberg and Kenneth Gould have also considered Veblen from within environmental sociology, albeit to a very limited extent. For instance, Gould et al. (1996) emphasized Veblen’s contention that the steadily increasing control of production decision making by accountants over engineers represented a qualitative shift in modern industry. In a corresponding alignment of Veblen’s own contents, Gould et al. asserted that production and transportation details, including how to obtain raw materials and where to dispose of waste, are still dealt with by engineers and lower level workers, “but the management of these enterprises is increasingly concerned only with fiscal considerations—the so-called bottom line of the modern period” (p. 172). Veblen’s influence was clearly reflected as Schnaiberg and Gould (1994) made the case that “firms are increasingly owned by ‘absentee’ investors: actors who neither live in nor particularly care about the community in which the firm is located” (p. 60). It is a shame, though, that Veblen was only briefly discussed in this otherwise excellent contribution to environmental sociology.

In contrast, Veblen is given extensive credit in at least two significant radical economic works highly critical of capitalism: Baran and Sweezy’s (1966) Monopoly Capital and Kapp’s (1963) Social Costs of Business. Kapp’s analysis, though influenced by welfare economics, was Veblenian to the core in its institutional study of the social costs associated with the competitive utilization of resources, planned obsolescence, and destructive modern technologies. For example,

What Veblen has to say on “sabotage” and the delay and obstruction of industry and output (“the conscientious withdrawal of efficiency”) . . . on waste and duplication in industry, transportation, and distribution . . . the cumulative growth of salesmanship (and publicity) and their play on human credibility and the sensibilities of fear and shame; or on pecuniary waste . . . [on] personal futility and [on] the retardation and repression of civilization by the price system and its commercial standards of truth—these will always remain important suggestions [italics added] . . . define[d] as “social costs.” (p. 43)
Evidently, Veblen’s inspiration on the social and environmental impacts of capitalism has arguably been more deeply explored within fields other than environmental sociology. As one journalist has stated, some see in Veblen’s writing “an early understanding of the train wreck that awaits when insatiable desires meet finite natural resources—particularly as growing nations begin to mimic America’s consumer culture” (Solomon, 1999, p. E1). Others feel Veblen is “an early environmentalist standing opposed to the irrational (and in our day, dangerous) wastefulness of an industrial civilization guided by business interests alone” (Hughey & Vidich, 1993, p. 500). A Veblenian economist criticizing corporations, waste, and natural resource exploitation at the time of unbridled economic growth in America, then, does appear to have much to say on society and environment.

**CONCLUSION**

Can environmental sociology do without Veblen? My argument is that without him and the particular insights that he provided—which, sadly, have not been adequately embraced within the field—environmental sociology is essentially impoverished. So, how can Veblen enlighten those who concern themselves within this subfield? If, as Buttel (1997) indicated, the environmental implications of economic, political, and cultural institutions dominate research in environmental sociology, then we would do well to revisit and apply Veblenian institutional logic to such challenges.

To summarize, the three main areas with which Veblen largely concerned himself, which are entirely relevant to the study of environmental sociology, are capitalism, waste (both production and consumption), and absentee ownership. The thrust of Veblen’s analysis is on the contradiction between the capitalistic system, devoted to predatory, pecuniary ends, and the required engineering or technology to transform raw materials into consumable goods, or production of use values. Profit making at any social or environmental cost is the guiding principle that threads most of his later works. As Veblen so forcefully articulated time and time again, business interests are foreordained to exploit and squander resources. Sane, rational, efficient use of the environment and its resources is cast aside as externalities in cornucopian revelry. Any socioeconomic and political system built on the belief of “getting something for nothing” has no other choice but to satisfy its vested interests, leaving the rest of humanity to pay the costs of reduced availability of resources and environmental degradation.

Incessant waste of natural resources and relentless consumption in an age of “globalness” are environmental problems that many sociologists and economists treat as contemporary problems. These are not novel problems for society, although they most certainly have intensified to crisis or near crisis levels during the 20th century. At the core of *TLC*, Veblen (1899/1967b) believed that society is inherently wasteful. However, *TLC* has often been misinterpreted to refer to the foibles and follies of the rich engaged in excessive consumption; “those who take this interpretation then superimpose Veblen upon utilitarianism” (D. B. Hamilton, 1987, p. 1539). Veblen was not saying that conspicuous consumption was a kind of social aberration or irrational consumption, or that we should always consider the usefulness of our conduct and its consequences. To the contrary, Veblen rejected any kind of hedonistic explanation of consumption behavior. His was a theory of consumption in cultural as opposed to individual terms, in that all behavior is a culturally conditioned and derived form (D. B. Hamilton, 1987).
How does this all tie into capitalism? One of the main consequences of capitalism has been the transformation of consumption and waste into an honorific endeavor. Consumption for its own sake, with all the waste that it entails, becomes a defining feature of any culture under corporate capitalism. Thus, it is very difficult to read Veblen without understanding that he was both skeptical and critical of this development. One of the prevailing problems with capitalism in his view was that as industry became increasingly specialized, a state of affairs would be reached in which the business controllers of the industrious sphere would have little knowledge or understanding of its functioning. To increase profits by producing and selling more goods rather than improve production technologies and processes, Veblen felt that businessmen would turn instead to wasteful business practices or manipulations such as market speculation and state-sanctioned collusion. Although Veblen was concerned with waste, it was the cultural consequences and implications of contemporary capitalism that drew his wrath.

Absentee ownership is another pioneering concept that Veblen critiqued during an age of expansionary industrial growth. Veblen saw that wasteful industrial and civil practices become “normalized” as the leadership direction of businesses change, especially under absentee ownership. For Veblen, among those who comprehend his position, there is an inseparable connection among business corporations and government complicity to help them achieve their financial objectives. Thus, Veblen understood business leadership as an important social change dimension, a fact that tends to be ignored by many sociologists. Accusing managers of “trained incapacity” with their narrow, profit-oriented, and bureaucratic outlook, Veblen argued that an inherently poor understanding of efficient (and sustainable) production practices leads most managers and owners to wantonly exploit resources. He foresaw that the increased processing efficiency of (absentee) firms was responsible for the extraction of unprecedented volumes of raw materials, often leaving local communities at the mercy of corporate boardroom decisions. Thus, his analysis is especially relevant to those areas dependent on natural resources for livelihood, particularly those adversely affected by external, monopoly control.

Additionally, Veblen was among the first to make the connection between industry and its inherent waste as a class-based phenomena. As Saram (1994) has observed, Veblen not only located gender and class as crucial, interactive dynamics within a single stratification system; he outlined how these dynamics are further shaped by ethnicity (e.g., Black and White populations), nationality (e.g., North and South states), and patterns of residence (e.g., rural and urban areas). Yet, this is not to say that Veblen was the only theorist of his time or earlier to discuss such issues. Marx, for example, understood exploitation of labor on the basis of class as the controlling dynamic of capitalism and, as argued by Foster (1999), was very concerned about the enormous waste generated in agriculture and industry, even municipal sewage. By providing us with a classical perspective for environmental sociology, then, Veblen provided something analogous to Marx.

The ubiquitous Veblen is far from having served out his usefulness to society. Veblen’s works represent an absolutely essential contribution to environmental and natural resource sociology. Two valuable points can be made here. First, and most regrettably so, most environmental sociologists have chosen not to take a serious, comprehensive look at Veblen’s writings. Veblen has been mainly positioned within ecological economics or political economy, including noteworthy scholars such as Innis and Kapp, but his contributions have not carried forward to environ-
mental sociology. Second, most allusions to the environmental sociological aspects of Veblen’s writings are brief and nonsystemic. At best, he has warranted minor deliberation, and at worst, his critique of consumer society has been misconstrued to affect a small segment: the so-called leisure or predatory class. It is a mystery why Veblen’s (1923/1967a) final book, *AO*, a damming critique of the ecologically destructive and wasteful aspects of capitalism, and other relevant works have not merited significant discussion within environmental sociology.

So, where does this spotlight on Veblen, society, and environmental exploitation lead? I believe that environmental sociology could categorically benefit from a more systematic form of attention to the conjoint effects of technology, environment, and broader societal forces. Most crucially, Veblen made an early connection between the production-consumption nexus, especially among rapidly expanding countries of the North, and predatory businesses that rely on mass marketing and trendy consumerism for profits. Specifically building on the preceding analysis, environmental and natural resource sociology could profit immensely from Veblen’s theoretical underpinnings in the following two areas.

**Linking Veblen’s thought on production and consumerism.** Capitalism-environmental models could be better informed by a Veblenian perspective. His many useful prescriptions, such as incorporating technical input in corporate decision making, implementation of efficient extraction and production processes, reinforcement of workmanship values, and encouragement of responsible consumer habits, all have relevance to the interrelationship of environment and society. Veblen’s insistence that political and economic leaders should exercise some sense of responsibility for the sake of humanity and his call for a societal reordering to halt ever-expanding consumption and waste can provide some viable guidelines for the formulation of responsive, sane public policy.

**Examining environmental sociology from a classical perspective.** An improved understanding of environmental crises as linked to increasing production and consumption trends could be obtained by comparing the works of Marx, Weber, Veblen, and other social critics. Although Marx has been substantially analyzed from an ecological perspective (see Benton, 1996; Burkett, 1999; Foster, 1999, 2000; Gimenez, 2000; O’Connor, 1988), Veblen’s detailed distinctions of gender, class, and consumerism in an industrial-capitalism discourse have much to offer that many have either failed to recognize or simply chosen to ignore. According to Michael Hughey and Arthur Vidich (1993), Veblen’s understanding of modern capitalism surpasses that of Marx and Weber. For example,

> Weber did not recognize the systematic irregularities which Veblen found in the “imbecile institutions” and pecuniary calculus of the price system, including its irresponsible ecological wastefulness, its disregard for the management of resources in relation to human needs (“human serviceability”), and its periodic overexpansion of loan credit. (p. 500)

In contrast, Raymond Murphy (1994) drew on the implications of Weber’s analysis of Western rationalization by considering the complex relationship between social action and the processes of nature. Murphy’s conception of environmental classes is explored in terms of who benefits or not from an environmental degradation perspective, and he contended that nature must matter, even to sociologists. This position has also been taken by Matthias Gross (2000), who suggested that the
reflections of classical sociologists such as Émile Durkheim and Georg Simmel may be used “as a basis for a positive, intimate relationship between society and the rest of nature” (p. 277). Such views are worth exploring further in relation to Veblen’s own interpretation of the political economy of waste, consumption, and environmental crises.

As one author has pleaded, “Where is Thorstein Veblen now that we need him?” (Diggins, 1993, p. 481). It is hoped that this inquiry may foment a deeper understanding of the socioenvironmental impacts of global economic activities from a Veblenian perspective. His three iconoclastic works, *The Theory of the Leisure Class* (1899/1967b), *The Theory of Business Enterprise* (1904), and *Absentee Ownership* (1923/1967a), should be reconsidered within disciplines such as environmental sociology and political ecology. The irrationalities of consumption owing to envy and emulation as Veblen saw it at the turn of the 20th century have entrenched themselves in a global economy (i.e., the “New Order of Business,” as Veblen called it long before Reaganomics and Thatcherism, which so preoccupied the 1980s). The spread of consumerism abetted “by force or fraud” through sleek marketing and stockholder demands has led to a worldwide corporate stranglehold. To a much greater extent today than in Veblen’s era, productive efficiency and workmanship are sacrificed for the reification of money making and planned obsolescence. Leisure itself has become a consumable good, as Veblen predicted. In short, “the greatest voice from the frontier world of America” (Galbraith, 1958/1969, p. 52) still has much to offer contemporary society and the environment we all share.

**NOTES**

1. An interesting account of Veblen as artist, economist, and radical philosopher can be found in Joseph Dorfman (1958).

2. On this point, and for an excellent analysis of Veblen’s theoretical treatment of American capitalism as distinct from Marx and Schumpeter, see Paul Sweezy (1958).

3. For more on Veblen’s account of natural resources, see “The Case of America” (Veblen, 1923/1967a, pp. 119-201), especially the subchapters “The Independent Farmer,” “The Country Town,” “The New Gold,” and “The Timber Lands and The Oil Fields.”

4. For Veblen’s (1923/1967a) description of rural America at the turn of the 20th century, see his subchapters “The Independent Farmer” and “The Country Town” (pp. 129-165). See also Veblen’s (1919/1969) *The Vested Interests and the Common Man*.

5. Concurringly, Freudenburg, Frickel, and Gramling (1995) asserted that increases in technical ingenuity have allowed humans to extract previously inaccessible resources.

6. See Veblen’s (1921/1933) *The Engineers and the Price System*.

7. Allan Schnaiberg (1980) also mentioned Veblen for his views on corporate “sabotage” of production, whereby product prices are kept high, but supply is restricted to increase profits (pp. 254-255).

8. Kapp (1963) defined social costs as “all direct and indirect losses sustained by third persons or the general public as a result of unrestrained economic activities” (p. 13).


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SCIENCE AND CULTURE IN THE ENVIRONMENTAL STATE

The Case of Reactor Layups at Ontario Hydro

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The widespread concern about the declining state of our physical environment is often accompanied by frustration about what to do to prevent or even reverse such deterioration. In the past, policy makers, legislators, and the general public have usually turned to scientists and scientific knowledge for answers. But recently, theorists and others have re-emphasized the importance of culture in understanding the environment. In this article, this culturalist critique of scientific knowledge is discussed and is then related to the decision by Ontario Hydro to lay up seven of its nuclear reactors. This situation is used to illustrate the continuing relevance of scientific knowledge for addressing environmental concerns.

The critical importance of culture for a proper understanding of our relationship with our environment has been reinvigorated recently by several theorists. One major focus of debate has been the neglect of cultural knowledge in favor of technical, scientific knowledge in the formation of environmental policy. Szerszynski (1996) and others (Goldblatt, 1996) have pithily summarized this as the issue of “knowing what to do.” How do we know what we should do about environmental problems? What body of knowledge can we use to resolve our current dilemmas, and how do we know that this body of knowledge is better than others? In this article, I take up this issue and argue that scientific knowledge gets short shrift in most proposals, which call for a more culturally based understanding of the environment as a way to deal with environmental concerns.

This article begins with a brief overview of Ulrich Beck’s (1992, 1996) influential ideas about the “risk society” and then tackles the culturalist critique of science that is tied to his writings. The next section identifies problems with this culturalist solution and shows that science cannot be completely abandoned in environmental policy discussions. A third section develops an alternative proposal, building on recent developments in the sociology of science. A fourth section presents an illustration that shows that science remains important in environmental decision making and that it is neither necessarily undemocratic nor as monolithic as culturalist critics contend. The final section offers a concluding assessment of the continuing importance of science for understanding the environment. Specifically, the argu-
ment is that trying to improve current environmental policies by calling on some body of cultural knowledge is not feasible and that we must instead recognize the diversity of what we call science and how it can help us understand our relationship with the environment.

**RISK AND THE CULTURALIST CRITIQUE OF SCIENCE**

Beck’s (1992) pioneering work on the transition to the risk society is a major source of inspiration for the discussion of current environmental controversies (Goldblatt, 1996; Lash, Szerszynski, & Wynne, 1996; Yearley, 1996). His major point is that contemporary societies are best understood as risk societies, in which the distribution of the negative consequences of industrial production has replaced the distribution of its fruits as a fundamental organizing principle (Lash et al., 1996). As Beck wrote, “In risk society, conflicts over the distribution of ‘bads’ produced by it are superimposed on the conflicts over the distribution of societal ‘goods’” (Beck, 1996, p. 28). Furthermore, “the entry into risk society occurs at the moment when hazards which are now decided and consequently produced by society undermine and/or cancel out the established safety systems of the provident state’s existing risk calculations” (p. 31). In other words, the risk society materializes when we no longer have the ability to control the hazards we decide to produce, and the distribution of these hazards across the population becomes as much of an issue as the allocation of the benefits of industrialization.

Industrial societies produce risks—through instrumentally rational decisions—and in the process, they are transformed into risk societies in which the calculability of hazards using these same instrumentally rational principles becomes impossible. According to Beck, our current understanding of “the environmental crisis” is just as much if not more a product of our institutions than it is of “actual physical threats.” Environmental problems are not ecological problems but reflections of institutional crises in industrial society and a sure sign that we have entered the era of risk.

The idea that environmental problems are reflections of socioinstitutional rather than biological difficulties represents a break with instrumentally rational understandings of the physical world. Indeed, Szerszynski, Lash, and Wynne (1996) and others argued that the modernist, scientistic understanding of the environment as a purely separate physical world is an integral part of current environmental problems and a barrier to real solutions for the future. This is why programs emanating from paradigms as diverse as neoclassical economics, the limits to growth and sustainable development are inadequate. Szerszynski et al. contended that

the translation of things “environmental” into authoritative scientific and policy vocabularies occurs in ways which could be described as, amongst other things, epistemologically “realist,” positivistic, disembedded, technological and cognitivist, and that it thus tends to mask important cultural, social and existential dimensions of the contemporary “environmental crisis.” (p. 1)

Some environmentalists, activists, and academics share this view that designing environmental policies based on scientific criteria is a dangerous and often erroneous course of action. This culturalist critique rests on three main criticisms of the role of science in environmental decision making.
First and probably most frequently expressed is the claim that scientific and industrial advances are responsible for many of the problems we now face. Preindustrial ecological catastrophes were usually more localized and often took much longer to manifest than many of the threats we face currently (Beck, 1992). Nuclear meltdowns, global warming, and ozone depletion are all problems we would not face were it not for science. Moreover, their potential consequences are arguably more serious and widespread than nonscientific environmental threats. This is not to deny that science and industrialization have also produced many good benefits. Rather, the point is that science creates many problems, often unintentionally, so relying on it to solve environmental crises is wrongheaded (Beck, 1992; Harper, 1996).

Second, it can and has been shown that relying on expert scientific advice has resulted in poor environmental decisions. Robin Grove-White (1996), for example, discussed three interesting cases. In one instance, he showed how strict economistic models used to cost out the Sizewell nuclear plant in Britain underestimated the true cost by 50%. However, had the nonscientific models proposed by local environmentalists been used, the government would have had a much better estimate of the true cost of the plant, and it might have decided against building the facility. Novek and Kampen (1992) also revealed the serious flaws in the environmental impact assessments of pulp mills in northern Alberta. Indeed, there is no shortage of examples that show that relying on expert knowledge has produced undesirable policy outcomes.

A third argument raised against science as a basis for policy is the claim that science is rooted in an outdated, modernist conception of the world. Modernism is dead, so the argument goes, and we must jettison those things that rely on modernism for their vitality. The “myths of modernity” (Grove-White, 1996, p. 284)—a belief in the power of prediction and control and that individuals have control over their own destiny—can no longer be sustained. Science, based as it is on prediction and control, is also no longer tenable, and to continue to place faith in scientific knowledge is to cling to a potentially harmful illusion. The separation of the natural world from humanity, and the scientific and technical understanding of the world that supports this distinction, is the real source of the problem.

THE CULTURALIST ALTERNATIVE AND ITS PROBLEMS

This last objection to science, which resonates well with Beck’s (1992) insistence on the social bases of the environmental crisis, is the most serious of the three. Most scientists and policy makers would agree that scientific knowledge has led to intentional and unintentional environmental problems. Moreover, they are also likely to agree that even when it has been used properly, it has occasionally resulted in destructive policies. However, many of them would likely still see a role for scientific and expert knowledge for understanding environmental problems.

But the third objection is a direct challenge to the role of science in this process. Many commentators argue that what we need is a more culturalist understanding of the environment to know “what we ought to do about the crisis” (Szerszynski, 1996, p. 104). Although the specifics often differ, the general point is the same across much of this literature. That is, the modernist assumptions that underlie science and policy discourses must be abandoned before real progress can be made on environ-
mental problems. This point is clearly stated in the Szerszynski quote above, but the general idea is also articulated by others.

For instance, Grove-White (1996) argued that the knowledge used by policy-making bodies in Britain is not sufficiently cultural in that it is exclusively scientific, rational, and individualistic (i.e., modernist). He contended that modernist, scientific knowledge should not be used as the basis for policy because it is too limited and undemocratic. It is limited because it is founded on the myths of modernity, and it is undemocratic because by claiming to provide the truth about the world, it effectively silences competing viewpoints and participants (see also McDonell, 1997; Mehta, 1997; Wynne, 1996b). Instead, we need to pay attention to the specific cultural and relational knowledges of particular places and times to set us on the right path. Modernity and its myths must be replaced with knowledge “of what real people are like and what their relational and communal needs may be, in the circumstances of modern complex societies” (Grove-White, 1996, p. 283). Furthermore, there is an urgent need for “pretensions, practices and methods radically different from those involved in the increasingly dominant quantitative sciences (natural and social)” (Grove-White, 1996, p. 284). He claimed that a more culturalist approach has something important to offer in environmental decisions by highlighting those processes and knowledges that get ignored in most policy discussions. Cultural knowledge is simply not relevant to most policy makers, economists, and others who rely exclusively on modernist knowledge. But a qualitative, personalized, and attentive research strategy can provide greater opportunities for wider participation in the decision-making process (see also Mehta, 1997; Wynne, 1996a).

Maarten Hajer (1995) stressed the undemocratic nature of expert scientific advice. He wrote,

The institutional practices of privileged expert advice have led to a negation of all sorts of critical capacities in society and have falsely resulted in a delegation of decision-making on some of the most important decisions to experts’ councils that operate beyond the realm of democratic control. (p. 282)

This echoes Beck’s (1992) claim that “it is increasingly the case that experts rule, even where politicians are nominally in charge” (p. 35). Here, Beck is relying on Schelsky’s point that “technical-scientific decisions cannot be subject to any democratic informed opinion” (p. 35). One solution to this problem of a lack of democracy is to open up the process of environmental policy making to allow for the participation of nonscientific ways of knowing. As Hajer argued,

What is called for are institutional practices that allow for the playing off against one another of different sorts of knowledge. Rather than orienting ourselves on science as the universal discourse, one might choose to facilitate the institutionalization of a public language that would allow for productive interdiscursive debates. (p. 282)

Although these solutions to the problems of environmental policy formation have some appeal, they suffer from three critical problems. First, it is never made clear in the culturalist critique which body of knowledge we should draw on to generate this new approach to the environment. If we are truly into the era of many cultures, which set of cultures do we draw on to inform our policies? Wynne (1996a), Grove-White (1996), and Yearley (1996), among others, would seem to suggest
that we should look to the localized knowledges of people and groups before they come into contact with formal institutions. This has some affinities with projects for reclaiming a public space proposed by Habermas (1989) and others, and this may indeed prove to be a desirable strategy. However, a more complete delineation of where this alternative might come from and what it might look like seems in order.

Second, it seems only prudent to make sure that before we throw out a key component of the knowledge that has underpinned our approach to the environment, we will have some sort of replacement ready to fill in the gap. It would be desirable to have some assurance that if we proceed with this change, we will be better off in the long run. This view is clearly not shared by others, who claim, for instance, that “such [cultural] approaches offer no guarantees of grand solutions. But they are better than driving blind, at increasing speed—which is what we are being pressed to do even more” (Grove-White, 1996, p. 284). This is hardly justification for the sort of upheaval being advocated. It is incumbent on the proponents of the culturalist view to provide a compelling argument about how this change will improve our lives.

Third and most important, replacing science with some body of cultural knowledge is impossible because science itself is fundamentally cultural. This is a basic insight of the social study of science, and Beck (1992) elaborated it clearly in his discussion of primary versus reflexive scientization. Wynne (1996a) developed this point about different types of knowledges by considering the distinction between scientific and lay knowledges. He pointed out that the distinction between lay and expert knowledges is inherently problematic because science is deeply cultural, both at the level of the laboratory and as a manifestation of the culture of modernism. As Wynne put it,

Once one introduces the idea that scientific expert knowledge itself embodies a particular culture—that is, it disseminates and imposes particular and problematic normative versions of the human and the social—then this fundamental divide is no longer tenable. An important strand of sociological and historical work on science has problematised the supposition of an objective boundary between science and the public domain, as if for example knowledge and cognitive influence only flow one way, and as if there were not cultural, epistemic and cognitive commitments that were in principle open, but held in common and mutually reinforcing across the boundary. (1996a, p. 75)

To replace science with something else, it would have to be surgically extracted from social life. But determining where science ends and something else begins is far from straightforward. Science and scientific knowledge are integral components of modern culture that cannot be removed without fundamental alterations to that culture.

THE ATTACK ON MODERNIST SCIENCE

But even if replacing science with some body of culturalist knowledge is impossible, many commentators continue to argue that science is a manifestation of modernism, and because of this, it is still problematic as an element of environmental policy. Science represents the epitome of modernist ideals, which are outdated or at least less relevant in the contemporary, postmodern age.

For instance, Wynne (1996a) argued that the debate about the divide between expert and cultural knowledge is no longer important, but the problem of the mod-
ernist roots of science and expert knowledge are still a barrier to adequate environmental policy. The cultural basis of science is now recognized, but the problem lies with the cultural values on which it is based. As Wynne and others saw it (Yearley, 1996), science is based on certain modernist cultural norms, such as an interest in prediction and control, a notion of universal truth, and the elevation of scientific expertise above other forms of knowledge.

The central problem that these modernist notions and, in particular, the values of prediction and control pose for informing policy are that they are unachievable. Just like the quest for a singular objective truth, it is impossible to control or predict occurrences. As Szerszynski et al. (1996) argued,

Perhaps because the world has become more complex and unpredictable than it was, or perhaps simply because it has always been more complex and unpredictable than we thought, the social—and natural—sciences need to move away from an orientation to the future based on naively modernist ideas of prediction and control. (p. 10)

They continued by saying that

the future is not a pre-existing land towards which we are all moving.... a simultaneous recognition of the intrinsic indeterminacy of the future, and of all our roles in shaping that future, impose on us all the duty to take responsibility for the future that we are creating. (p. 10)

This second quote raises an interesting contradiction in the attack on modernist science. In the first quote above, we are being asked to throw over prediction and control as bases for science and policy, whereas in the second quote we are being asked to take responsibility for the future. Yet in any reasonable sense of the word, responsibility implies at least some degree of control. To take responsibility for the future, we must have some degree of control over it or at least think that we have some control over it.

Attempts to predict and control the future, in an inclusive sense, are not strictly tied to the development of modernism or to science. They can be pushed back at least as far as the transition from hunting and gathering to agricultural societies. In other words, there are many nonscientific and nonrational versions of these ideas (see also Wynne, 1996b). Moreover, regardless of whether they are based on science, policies are fundamentally attempts to control or at least alter behavior. Yet it is not ever made clear how we would take this responsibility without concerning ourselves, at least in some fashion, with trying to predict and/or control what the future holds for us. A policy that does not exert control is simply not a policy. If we are to give up on prediction and control, then we must also give up on policy, not just science.

A second problem with the critique of modernist science as a basis for decision making in the environmental state is that the critique is based on a very traditional view of science. For instance, Hajer (1995) complained of the undemocratic nature of science, whereas Grove-White (1996) was concerned about its lack of attention to people’s lived experience. These are features of Beck’s (1992) primary scientization rather than reflexive scientization. But as Beck said, primary scientization “can only be observed in marginal areas of modernization, if at all” (p. 158). This is surprising, because many of the critics of modernist science are well steeped in and have made contributions to the social scientific study of science.
CONTROVERSY AND MULTIVALENCY IN THE SOCIAL STUDY OF SCIENCE

For the purposes of this article, there have been two important developments recently in the social study of science. First, there has been a sense of frustration about controversy studies continuing to remain a central focus of the field. Second, the multivalent nature of science has recently been emphasized.

Several commentators have expressed frustration at the continuing interest in scientific controversies as the focus of analysis in social studies of science. According to some observers, we already have a good understanding of the dynamics of scientific controversies and how one side or point of view comes to dominate another. Collins (1996) and others (Brante, Fuller, & Lynch, 1993) were exasperated about the endless stream of “controversy studies” that largely redocument well-worn ideas, regardless of whether the controversy under consideration is old or new.

The assumption in the past has been that once the debate is resolved, all of the sociologically interesting material has disappeared. But there are good reasons for studying cases in which there is no controversy, little controversy, or the controversy has been resolved without focussing simply on how that resolution came about. In other words, studying instances of resolved conflicts or decisions can be illuminating as well (see Collins, 2000, for a discussion of what happens to “rejected sciences”).

The point of studying agreements is not to be able to say, “See, science was right all along.” There are, of course, numerous problems with this response, but I will touch on only three of them. First, even the most hard-nosed scientists would agree that science cannot lead to unequivocal policy directives (the “is-ought” or “fact-value” distinction), so the connection between scientific knowledge and a course of action remains unclear. An additional problem with this argument—and with those that merely demonstrate a case in which science has gone wrong (Grove-White, 1996)—is that the validity and usefulness of science becomes nothing more than a numbers game. It is useful if we can muster more examples in which science has been right than where it has been wrong, and it is not useful if the opposite is true.

Third, science is often deployed by participants on all sides of a debate, particularly in the arena of environmental policy. So science is often both right and wrong in these disputes before a consensus is reached. And as Wynne (1996b) and Fujimura (1998) showed, the sides in any dispute are not nearly as homogeneous as they are made out to be, either by the participants or by researchers.

A second development, articulated most clearly by Van der Sluijs, Van Eijndhoven, Shackley, and Wynne (1998), is that science is multivalent. It is not the unitary body of ideas and practices that it is often made out to be, either by its adherents or its critics (Collins, 2000; Fujimura, 1998). Rather, not all scientists use the same approaches, methods, theories, or assumptions. This point has not received much attention in the past, partly because the social study of science has been so dominated by controversy studies (Collins, 2000; Fujimura, 1998). Studying controversies has led to a focus on how one vision of science wins a battle against other visions. In contrast, studying agreements, particularly real-world agreements and not those internal to a specific scientific discipline, can reveal how the many different visions of science come together on a position.

One implication of this point is that science need not be modernist or committed to any singular value (such as universal truth or a common method) but can be composed of numerous approaches and insights (see also Williams, 2000). Conceived
in this way, the attack on modernist science becomes irrelevant. Thinking of science as a nonunified set of practices is a more accurate reflection of the actual conduct of science in its many different forms (Beck, 1992; Fuller, 1993, 1999; Latour & Woolgar, 1979).

The very term *science* and all of the understandings this implies may be useful in promoting understanding among groups (Yearley, 1996). That is, science comes in many different forms, but the common name may induce groups to attempt to understand one another. It may provide an opportunity for cross-cultural communication and tolerance between different scientific communities and between scientific communities and those that use the results of science (such as social movements, politicians, and policy makers). As Calhoun (1995) showed, to understand a culture without evaluating it from within another culture necessarily implies a transformation in knowledge. This transformation is viewed as a progressive step to the extent that it leads to deeper understanding.

Potentially, this transformation will lead to a greater tolerance of different positions on an environmental issue. To borrow Calhoun’s (1995) example, once we understand both rugby and football, it may be possible to continue to play both games without falling into evaluating one from the standpoint of the other. The ability to dismiss others as fraudulent or to ignore them completely is greatly reduced. Similarly, once we understand different versions of science, we may be more accepting of the claims put forward by all scientists, which could have the potential to extend democratic participation in environmental decision making rather than reducing it. Of course, different visions of science may lead in the opposite direction, toward boundary work and attempts to declare other forms of knowledge as “not science” with all of the loss of prestige that this entails (Collins, 2000). But boundary work is not inevitable, so it becomes an empirical question whether science still has a place in environmental decision making and how science reduces or increases participation in these decisions. Williams (2000) hoped that different groups involved in environmental conflicts and management possess a genuine desire to listen to and understand the points of view of other participants. This opens up the possibility that science can have a democratizing effect on environmental decision making rather than being fundamentally undemocratic.

In addition, science may resonate well with public understandings of the way in which decisions about the environment should be made. Dunlap (1998) and others have shown that lay public understandings of science and scientific concepts is low, but this does not preclude a belief in the utility of science, at least as one important component of knowing what to do about the environment. Indeed, Cohen (1998) suggested that respect for science among the general public is an important cultural prerequisite for countries wishing to pursue paths of ecological modernization. Similarly, Kraft (2000) and Johnson and Scicchitano (2000) argued that science is an important component of public participation in efforts to move toward sustainability. And public participation is often viewed as a crucial element not only in developing acceptable policies to deal with environmental problems but also in reducing past levels of mistrust about previous environmental policies (Halfacre, Matheny, & Rosenbaum, 2000).

**REACTOR LAYUPS AT ONTARIO HYDRO**

The situation chosen to illustrate these issues is the inquiry into Ontario Hydro’s decision in August 1997 to lay up 7 of its 20 nuclear reactors and to close permanently its heavy water plant at the Bruce nuclear station in Ontario, Canada.
Hydro, which has recently been partially privatized and changed its name, continues to operate 12 nuclear reactors at three sites, 4 reactors at the Bruce Station on the eastern shore of Lake Huron, and 4 each at the Darlington and Pickering stations on Lake Ontario, just east of Toronto. This is the largest “voluntary” reduction in nuclear generating capacity in the world. The shutdown came in response to an independent consultant’s report that claimed that the safety of these reactors was “minimally acceptable” (Ontario Hydro Nuclear Performance Advisory Group [NPAG], 1997, p. 3). The closure generated a great deal of media coverage and fueled public concerns about such things as privatization of Ontario Hydro, the cost of electricity, and the safety of the plants and the reactors that remain in service. The viability of alternative power sources, such as wind, solar, and cogeneration, and the economic impact of the closures on the surrounding communities also received attention (“Hydro Shock,” 1997, p. A17).

Environmental groups hailed the closure as a very positive move. Dave Martin of the nuclear watchdog group Nuclear Awareness Project said that the decision was a “victory for the people of Ontario and the environment” (“Hydro Shock,” 1997, p. A17). He and other environmentalists also believed that even though the layups were officially temporary, these reactors have effectively been closed permanently because virtually all other reactors that have been laid up around the world have never reopened. And the longer a reactor is out of service, the more expensive it is to restart.

Although media accounts of the decision characterized it as a surprise, there were numerous stories and editorials about problems at both the Pickering and Bruce plants in the months leading up to the announcement. Stories about the unusually short renewal of Hydro’s license to operate the Pickering plant, heavy water leaks and heavy metal discharges, and cracks in steam lines at the Bruce station and even some of the preliminary reports leading up to the final review were reported in several major Canadian newspapers.

The decision to lay up the reactors created enough of a controversy that the provincial government established the Select Committee on Ontario Hydro Nuclear Affairs. Executives from Hydro, politicians, environmental groups, and concerned individuals and associations appeared before this committee to offer their views of the problems at Ontario Hydro. The official records of these committee hearings plus material from the groups involved in the hearings form the primary data source for this article.

At the committee hearings, the decision to lay up the reactors received scrutiny from panel members in an attempt to determine “what went wrong” (Legislative Assembly of Ontario, 1997, September 30). There was little stated opposition to the decision from groups and individuals appearing before the committee, with the exception of the Power Workers Union. Instead, officials from Ontario Hydro, the Atomic Energy Control Board (AECB), and community and environmental groups again publicly endorsed the shutdown decision. These groups invariably appealed to some version of science to justify their support for the decision.

Interestingly, the major reasons given by the various groups for supporting the decision are not what might be expected. Environmental groups such as Nuclear Awareness Project and EnergyProbe stressed the economic sensibility of the layup and paid less attention to safety issues. These groups have “scientifically” documented safety problems extensively over many years. To many of them, the safety problems are so obvious that they do not require reiteration. Rather, these groups chose to focus on showing that nuclear power is very expensive, using the standard theories and procedures of economics.
In contrast, Ontario Hydro and AECB officials emphasized the potential safety problems in the future as the major reasons for the shutdown, virtually ignoring economic concerns. They relied on the management science of an internal report to close the reactors to preserve the safety of the plants. Ontario Hydro executives had drawn up business plans, again according to standard economic dictums, that show that nuclear power is a cost-effective generation strategy. They also pointed out that the plants are engineered in such a way that they are completely safe. In other words, virtually all groups in this process pointed to a scientific basis for their claims.

The board of directors of Ontario Hydro was the official body that ultimately made the decision to lay up the seven reactors, although it did so primarily on the advice of an Independent, Internal Performance Assessment (IIPA) report, prepared by a team of “nuclear experts” headed by Carl Andognini. Andognini had been brought in specifically by the president and CEO of Ontario Hydro to perform a “brutally honest” (Ontario Hydro NPAG, 1997, p. 2) appraisal of the state of Ontario Hydro’s nuclear division. He brought with him a large team of experts, and they spent several months reviewing all of the operations of Ontario Hydro Nuclear using standard management science procedures such as “the IPAP methodology developed by the USNRC (Inspection Procedure No. 93808)” (Ontario Hydro NPAG, 1997, p. 3). Some components of the assessment, such as the engineering, radiation protection, and chemistry of the plants and reactors drew heavily on the disciplines of physics, chemistry, and engineering, whereas other areas such as organizational effectiveness and operations were assessed using the principles of economics, business, and management science.

The report stated specifically that all of the reactors run by Ontario Hydro were currently safe. However, there were significant problems looming on the horizon if changes were not made to the structure and operation of the plants. For Andognini and his team, the difficulties were related more to personnel and management rather than physical deficiencies with the reactors. The team found evidence of, among other things, alcohol and drug use by employees on the job, contradictory and counter-productive management structures, major communication gaps, and a lack of leadership at all levels of the nuclear division. These problems stemmed from the “nuclear cult” (Legislative Assembly of Ontario, 1997, October 8) and its culture of invincibility, which had allegedly allowed monitoring and safety checks to deteriorate significantly. Andognini claimed that if these problems were not addressed immediately, they could soon jeopardize the safety of the plants.

In explaining the report and subsequent layup decision to the Select Committee, Ontario Hydro chairman Bill Farlinger made it clear that the board had to understand the technical basis of the decision as well as the subsequent recovery plan. This included a series of events that had taken place within the past couple of years, such as short-term shutdowns of several reactors because of safety problems, an unusually short license renewal for the Pickering station, and the fact that none of the plants had met its performance targets and all were operating at 60% capacity in 1996/1997. But the most important problem, according to Farlinger, was the extremely poor management practices that had plagued Ontario Hydro for years and that now threatened to compromise the safety of the reactors if drastic action was not taken. Based on these problems and the advice of “nuclear experts” (Legislative Assembly of Ontario, 1997, October 6), the board made the layup decision. When questioned on the matter by the committee, Farlinger repeated the technical and scientific underpinnings of the decision (Legislative Assembly Ontario, 1997).
Andognini, when questioned by the committee, repeated many of the same points raised by Farlinger about the safety of the reactors being potentially compromised by poor management structures and practices. In other words, management science had allowed Andognini and his team to identify problems that had the potential to create serious nuclear safety problems.

The AECB, which is the federal regulator of all nuclear activities in Canada, did not disagree with the layup decision. Committee testimony by its president and director general of reactor regulation reiterated that the reactors were currently safe to operate but that there were serious problems in all of the plants, which required attention. Moreover, these were problems that had been repeatedly identified by the AECB as early as 1986, and despite promises of corrective action by Ontario Hydro, the problems had never been fixed. The president of the AECB also stated repeatedly that although they set, license, monitor, and enforce safety standards for nuclear reactors, it is up to the licensee as to how it will actually meet these requirements. As such, the AECB was not prepared to comment on the suitability of the layup decision, only that it was not inconsistent with necessary improvements to performance. The AECB’s concern and its mandate is to ensure that the reactors are operated according to “accepted standards related to nuclear safety” (Legislative Assembly of Ontario, 1997, October 7). However, the AECB did point out that not all of the problems were management based but that there were significant engineering problems that needed to be resolved as well.

Testimony from environmental groups to the Select Committee tended to downplay the safety concerns of the reactors in favor of economic problems. This is not to say that they ignored safety problems, and certainly many of the groups owe their existence to public concern about the safety of nuclear power generation. However, many of these groups, especially the older groups such as EnergyProbe, have fought political battles over the safety of reactors in the past without much success. They appeared to be trying a new tactic and a new science to make their arguments. For example, of the five recommendations that EnergyProbe made to the Select Committee, four dealt strictly with economic concerns, such as the costs of nuclear power and the costs of the nuclear recovery plan proposed by Ontario Hydro (Legislative Assembly of Ontario, 1997, October 20). And although they agreed with Ontario Hydro that the layup decision was precipitated by bad management, they do not think that improved management alone will fix the problems that have led to taking the seven reactors off line. As Norm Rubin, director of nuclear research for EnergyProbe, told the Select Committee,

More ominously still, Hydro is still applying wishful thinking in nuclear safety. Throughout the IIPA report, despite its rather honest and brutal examination of Hydro’s failings, there is a laboured attempt to convince the reader that the Candu reactor is an inherently safe, forgiving piece of technology. It is not. (Legislative Assembly of Ontario, 1997, October 20)

EnergyProbe and other environmental groups believed that the layup decision was the correct decision for both economic and public safety reasons, and they wished to impress on the Select Committee the importance of not restarting the reactors. To them, this would be bad for the economy of Ontario and the safety of its citizens. In contrast, one of the few groups to oppose the layup decision was the Power Workers Union. This union represents most of the people who run the reactors as well as workers in fossil fuel and hydraulic generation plants. The Power Workers
Union has presented the Select Committee with a different recovery plan than the one outlined by Andognini, based on the economic sense of restarting the reactors, rather than writing them off. The Society of Ontario Hydro Professional and Administrative Employees, which represents all of the scientists, accountants, engineers, economists, and other researchers who work for Hydro, fully endorsed Ontario Hydro’s plan to restart the reactors, and if anything, it wanted them restarted more quickly than Hydro proposed. Again, this group appealed to the economics of this position, and it almost took for granted that the reactors are or will be made safe. As the president of the society said,

The only way to limit greenhouse gas economically is through nuclear recovery. Using gas to generate electricity will increase our greenhouse gas problems. In addition, nuclear recovery provides Hydro with a competitive edge. With nuclear as part of the generation mix, Hydro can be the lowest-cost generator at the margin, as shown by a Resource Data International study of 32 utilities across the northeastern part of North America. Without nuclear generation, Hydro cannot be competitive. (Legislative Assembly of Ontario, 1997, October 21)

Many community groups, especially those in areas affected by the shutdowns, also side with Ontario Hydro about restarting the reactors. These groups are careful to agree with Ontario Hydro that the reactors are currently safe and that nuclear generation is an inherently safe technology, so the key question must then be the economic importance of the nuclear plants, especially to their regional economies. As the reeve of a township near one of the plants where four reactors were laid up told the committee,

We believe there is little argument that the province needs electricity to function efficiently. Locally, we believe nuclear power is a proven, reliable source which has many environmental advantages over fossil fuel sources, and there are limits to other sources of electricity. The Bruce nuclear power development has a huge, local economic impact. . . . Due to the larger, relative impacts to Bruce county than in other areas, consideration should be given to bringing Bruce A back into operation sooner than the other nuclear plants. (Legislative Assembly of Ontario, 1997, October 29)

Some other groups and local politicians are asking the province for more money to shore up emergency infrastructures in case a nuclear accident did happen, whereas others are lobbying for environmental impact assessments and other assurances of safety before restarting the reactors is even considered.

What this example shows is that science is not a body of knowledge that operates just in the official domain. Anyone who is familiar with its workings can use it to act. Indeed, it is a crucial component of the action of environmental groups, community groups, and unions, most of which are outside of official state bodies. Despite the fact that Wynne (1996a) and others claimed that environmentalism has lost its true cultural critique of modernism by adopting the trappings of science, it is nonetheless used extensively by environmental groups, often unapologetically. As one environmentalist in this dispute put it, “To give a credible critique, you need science.” This individual and the group he belongs to have done extensive work to figure out the physics and engineering of Candu reactors and to communicate this with their members and the public. This reinforces the point that internal critiques can be more effective than external ones and that at least some environmentalists have made the attempt to understand the science of nuclear reactors.
It might be argued that all this shows is that groups can use science to promote their own interests. Although there may be some merit to this objection, it does not diminish the point that science is not a fundamentally undemocratic form of knowledge. Each group, from the most powerful political and organizational officials to the most loosely organized individuals and movements, drew on an eclectic mix of scientific concepts, theories, and traditions to participate in an important forum of the environmental state. It was not just experts who used science as an avenue of participation, as Beck (1992) has suggested. It was used just as much by laypeople and arguably just as effectively. The lack of boundary work among all participants in the hearings made science a useful resource for many groups who might not normally be able to participate in these forums. Dismissing science as merely a tool in interest group politics misses these points entirely.

CONCLUSION

Science in the above illustration came in many different guises. Environmental groups relied primarily on economics to justify their support for the shutdown decision, whereas Ontario Hydro was prompted into the decision by the results of management science. The AECB drew more on engineering problems in evaluating the decision, and the Power Workers Union used economics to argue that the decision was wrong. In addition, the sciences of risk assessment, engineering, chemistry, and epidemiology were drawn on to lesser extents by various community groups, often in many different ways, in support of the decision.

Because science is multifaceted, it can be used to achieve or at least justify widespread agreements. However, these agreements and policy decisions need not be made by bodies that include all parties. Ontario Hydro made its decision independently, and it just happened to agree with the AECB, most politicians, and environmentalists. That is, agreement is not something that must be the product of controversy. It can arise unilaterally. It is clear that Ontario Hydro did not make this decision because it suddenly became less powerful than the environmentalists. This decision was made for other reasons that may or may not be discernible to outsiders.

Science was also employed in the disagreements on all sides of the eventual consensus. The reasons for supporting the decision were always scientific, even though different groups pulled from different versions of science. Also, the proposal to reopen the reactors is and will be hotly contested, again by drawing on numerous visions of science. So a multidimensional image of science can make even thin agreements possible.

Interestingly, the amount of boundary work by proponents of different versions of science was muted. Although the arenas of the Select Committee meetings and the mass media may not have been the most likely venues for these discussions, several environmentalists noted that they rarely encountered direct challenges to the legitimacy of their scientific claims from either Ontario Hydro or the AECB. There were challenges to interpretations and questions about methodology and procedures from all sides, but there was no evidence of any challenges in principle to an economic view or an epidemiological view of the situation, for example. Rather than trying to refute the scientific status of a particular argument, most participants simply ignored competing claims. This is interesting, given that Dunlap (1998) has shown that the general public is often not well-informed about the scientific details of environmental problems. In this case, at least, there was very little effort made to examine the scientific credibility of other participants in the process.
Instead, science allowed many different groups to participate in the Select Committee hearings and to present their arguments in such a way that they were treated as legitimate by the committee. In other words, there was no evidence to suggest that science was used to stifle democratic participation in a state-sanctioned forum for making decisions about the environment. Indeed, if anything, science allowed for greater participation in this situation because different groups were able to pull from different visions of science to make their points. Science, then, is not necessarily undemocratic, nor is it as integrated and coherent as is often assumed.

So science does not need to be chucked out of the environmental state, as has been advocated by several critics. A multidimensional understanding of science is a better reflection of the state of affairs surrounding the above decision and can be useful in arriving at widely accepted interpretations of environmentally consequential events. It can help us exert some degree of control and responsibility over the future. This is not to say that all environmental decisions must be based solely on science, however diverse it may be, or that all groups who act in and on the decision-making structures of the environmental state should translate their objectives into scientific jargon. Science is not the only useful tool in this process. But science should also not be abandoned, because it can be effective for some groups, on some issues, at particular times. Science is not the monolithic entity that many of its critics make it out to be, and it can be employed in many different ways for many different purposes. One of those purposes is coming to some level of agreement about what we can do about specific environmental problems.

NOTES

1. A short summary of Beck’s (1992) ideas should be sufficient here because the intricacies of his arguments are rehearsed eloquently elsewhere (Goldblatt, 1996; Lash, Szerszynski, & Wynne, 1996).

2. These are similar to Grove-White’s (1996) myths of modernity.

3. “Deeper understanding” is, of course, a cultural value, just like “precision” or “predictability.”

4. Martin is less sanguine about the closures now because recent business plans released by Ontario Hydro were clearly based on restarting these reactors. Ontario Hydro has since been broken up, but on May 12, 2001 Bruce Power, a private company, finalized an agreement with Hydro’s successor to lease the Bruce nuclear station, with the intention of restarting two of the three laid up reactors.

5. Overlapping safety checks are the primary defense against major nuclear incidents.

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THE EDGE OF THE WORLD

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He discovers deep things out of darkness and brings deep shadows into the light.
(Job 12:22)

It seems almost every place on the planet has already been discovered. We walk where others have walked, see what has already been seen, and congratulate ourselves when we “conquer” that which we know has already been explored.

But down in the dark, in the black voids of caves, you can truly be the first to set foot in a place. And this time my group was lost. We couldn’t find where we were on the map. Our map showed miles of mazes and passages in Powell’s Cave, the second longest cave in Texas. Since the 1960s, Texas cavers (affiliated with the National Speleological Society and the Texas Speleological Association) have volunteered to come to this cave to survey. Over 2,600 survey shots were put in to make the current map, with many trips typically including 8- to 13-hour pushes. The map is a testimony to the determination and grit of the cavers who drew it. But if you’re lost in the cave, the map of Powell’s seems only an abstract black and white design of squiggly curves, wavy topographical lines, and straight directional lines. You can unfold it out again and again—revealing 17 miles of charted passage. Where are you in all this?

It’s a popular belief that old maps bore the phrase “here there be dragons” when the mapmakers reached the edge of their knowledge. Although cartographers disagree that there ever was such wording, it is true that this “edge space,” terra incognita, was often decorated with strange animals and mythological beasts. The unknown has always been terrifying to some. And a world, perhaps having an edge that might be approached unawares, must have been a terribly frightening conception. (Although over 2,000 years before Columbus, by the sixth century B.C., sailors and cartographers knew the earth was round, not flat.) Perhaps fanciful drawings were drawn on map edges because the mapmakers, artists in their own rights, just couldn’t stand the negative space. They drew in spouting sea serpents and open-mouthed monsters. Like the margins of notebook paper in homeroom, something about empty spaces on maps just cries out to be filled in, whether with facts or flights of fancy. Consider Jonathan Swift’s satirical observation, from On Poetry:

So Geographers, in Afric-maps,
With savage-pictures fill their gaps;
And o’er unhabitable downs
Place elephants for want of towns.

Our map of Powell’s Cave, too, had an edge space. It was white and blank, an enticement for cartographical prognostication. Two known passageways extended like fingers pointing toward each other; a caver had surmised there could be a hid-
den connection in the blank space between. If we could find this secret connection, future exploration times would be cut in half from using this short cut.

The Descent

Descending down into a cave is coming into contact with a primal part of your self. Almost everyone looks at a dark space and feels a strange, half-tingling urge—if not to explore, then at least to speculate. What’s down there? As Thoreau remarked in Walden, “Who does not remember the interest with which when young he looked at shelving rocks, or any approach to a cave? It was the natural yearning of that portion of our most primitive ancestors which still survived in us.” A cave calls to everyone, whispering dim secrets of dark space and mysteries.

The inside of a cave, near the entrance, is called the twilight zone. The zone suspends light and shadow, hanging them like a formless gray gauze. The air smells like moist potting soil, the skin of potatoes. . . the damp chalk of limestone. Life abounds here: scorpions, beetles, perhaps a few snakes, ticks, fleas, salamanders. If it is a bat cave, hundreds of tiny wings flapping and the bats’ soft ch-ch-ch twitterings will sound like distant water moving. They provide a mirage to the ear, not to the eye, of rapids crashing like static in the far recesses of the cave. I was once convinced by the sound that I was about to find water, until I was engulfed in a bat flight. A Mexican free-tailed bat flew to my helmet and clung upside down on the rim, looking straight into my eyes. We were only 2 inches apart, probably looking at each other cross-eyed. I didn’t breathe, blink, or move. He was no bigger than a fuzzy field mouse. He yawned. Wriggled. Then he ran his pink tongue out to groom one soft, extended wing, eyeing it carefully, like a man checking his sleeve length.

You can be caught up in miracles in this twilight zone. It’s easy. Sometimes the light outside penetrates the shadows in shafts and dust motes float in the silence, flying like fairies . . . or miracles. If you rappel down through the zone you may find yourself suspended with no sensation of moving, and yet feeling strangely that the cave is coming up to meet you. Caves are wells of magic and illusion. But the twilight zone is just the beginning of the cave. You have to move on. You press downward into deeper darkness.

Signs of life diminish as you go farther. No moss, lichen, or animal scat. Only rock. There is no sound except that of your movement—perhaps the sound of your denim jeans shuffling on rock, or your knee pad catching on a snag. Do your joints creak? You’ll hear them. If you exert yourself hard enough you’ll hear your own heartbeat thudding. Stop and rest and you’ll hear perfect silence—along with the whine of your ears ringing, buzzing your brain that this can’t be right, there must be something to hear! Toss a pebble and clink! The angry whine goes away, appeased, if only for a moment. Shut off your light long enough and your eyes will zing your brain into seeing shadows, lights, and kaleidoscopic colors. It’s sensory deprivation, a rare luxury in our modern world of cell phones, sound bites, and information highways.

In Powell’s Cave the twilight zone leads the way into a maze. The cave lies faulted in east-to-west joints, like a huge sheet of cracked peanut brittle. Crawlways run as straight as dark directional lines, meeting others in mazy routes that confuse even the most observant caver. Our team climbed down breakdown, rocks and slabs of long-ago collapsed ceiling. For hours we crawled, climbed, squirmed, and walked through passages. The places on the map where we thought we were became less and less recognizable.
“Here’s the maze passage, and that’s the stream passage . . . ” our team leader murmured as he traced the delineations with a muddy finger. We had unrolled the unfinished version of the map and adjusted our helmet lights to shine on its laminated surface. We had been walking stooped over, “duck-walking,” for the past half hour in a cramped passage, and welcomed sitting down in this place where the floor of the cave had a fine powder of limestone. It was cool and soft as flour. The slopes of the walls fit easily to our backs as we sipped water and ate granola, fingering the powder absentmindedly. It would make a fine little warren, I thought, for Peter Rabbit. If he were lost too.

“So we must be . . . hmmm,” our leader murmured. We looked at the map earnestly.

But truthfully, we had no idea. We could have taken a hundred wrong turns.

What difference does a map make when you’re lost? Often, not much. It’s like looking up a word when you don’t know how to spell it. A map is just a half representation of a place, a half truth. It only reveals someone else’s interpretations of the place, not our own.

For example, imagine mapping your own bedroom. What would you include? Would you start from a bird’s-eye view or draw a profile? You would probably draw your bed, the dresser, the closet. Would you carefully measure the room? In meters or feet? What would you not include? Would you draw the items in your closet, or the things in your dresser? Would you include a label of “closet” or include an international symbol—something you have made up to stand for closet? Would you include the landscape outside? The elevation of your house? Global Positioning System coordinates? Would you draw in your pets? Would you draw yourself, as a little stick figure, for scale?

What you leave out of a map tells just as much about yourself, and what you value, as what you include. My good friend who is an archaeologist says that she can always tell who draws the various gravesite maps during digs. “Our hand and foot guy always draws in the metacarpals and phalanges. The guy who likes teeth has arrows pointing to all the incisors, and the anthropologist just draws square outlines with labels of ‘miscellaneous bones.’ ”

No map has everything. Our map didn’t have all the new survey points included, so we couldn’t match our old data to the new survey tapes that dangled in the passages, left there by previous teams last year. We had no idea how far we had traveled, or still had to go.

The Push

We felt pressured to accomplish something. Six other teams were already at work in other parts of the cave system, presumably on target and less geographically challenged. Some were in wet suits, surveying an underground stream passage. The stream passage ranged from knee-deep muck, wriggling belly crawls, to waist-deep water. Cavers who brave the stream surveys balance a fine line between overheating while getting to the water in a full wet suit, or becoming hypothermic in the stream by not having a suit. Other teams, acting as controls for accuracy, were braving the 98° Texas heat topside with transmitters to receive radioed locations from cavers underground. Our team had shovels, a pickaxe, survey tape, geologists’ hammers, a dig bag, “pee bottles,” and plastic wrap for any solid wastes (which would have to be carried back out with us to keep the cave pristine). We were to push a lead, as it’s called. If we found a good one, such as discovering a walking passage,
we would be willing to work all day and night for it. Such troglodytic madness is defined as digging fever or mud in the blood.

But how do you find something, like a new passage or cave room, when you’re not sure one is there? Ancient Pacific islanders had surprisingly accurate maps made out of palm fronds, with shells marking positions of islands. But from an outrigger canoe, islands could only be seen from a few miles away. Like the west Texas plain, the ocean must have stretched to a lonely and infinite horizon. The wooden hulls of the canoes would have bobbed on the desert of water, lapped by waves repeating and repeating the vastness of the earth in soft undulations. The edge of the world pitched on blue meridians. Yet the navigators found new islands, miles and miles apart, by ingeniously observing the relationship between the main waves and the secondary, converging waves. Such choppy interferences told them an island was beyond their sight. Cavers do something similar by looking for small signs: leftover debris from water movement or airflow.

Airflow is a sign of something larger down below because caves “breathe.” As the barometric pressure outside shifts, caves equalize by breathing either in or out. It’s the same as stepping into a foyer of a building and feeling the gust of air conditioning when you open the door. Even the temperature in a cave is constant—the average of the yearly temperatures. (For Texas, it’s a pleasant 68° to 75°, with 95% to 100% humidity.) Several years ago a landowner dislodged a small pebble in a sinkhole and felt a tiny gust of air from the hole. After several days of digging, we opened an entire cave, never entered, where my footprint across the muddy floor was as startling as Armstrong’s on the moon. Airflow is nature’s nudge to a caver, an invisible breath from a presence nearby. How many people would notice such a small thing? How many people would notice small waves cresting on Pacific seas, and steer for a hidden island? And how many places are still hidden from us, because we can’t recognize the clues to reach their edges?

In Powell’s Cave, the airflow where we were was nominal, but we felt compelled to dig anyway. We contorted our bodies into narrow shelves, feeling for air movement. A squeeze requires you to exhale the air from your lungs and push your body through a narrow space. One person digs with hands outstretched overhead, scooping dirt and rocks into a dig bag by his head, and someone else pulls the bag out along side his body by a rope. We tried this process for a short while but made little progress. There was no hidden passage here. We were still in the wrong place to dig. We were still lost.

“It’s late,” someone said. “We should start heading back.” If we couldn’t remember precisely the way we had come in, we would be lost a long, long time. I felt my water bottle gingerly, weighing its level. Somewhere, far above us, the smells of the grasses were floating and the cloud shadows were passing like quiet, lumbering prayers across the plains. Daylight felt a million miles above and away.

Looking at the map, I again realized its inherent duplicity. Laden with tidy arrows and benign names like “the root route,” “Pete’s crawl,” and “the Hilton room,” everything had been “claimed” by someone. A map alludes to a type of ownership, a false control over the natural world. As Wallace Stegner says in his essay “Thoughts in a Dry Land,” “perception, like art and literature, like history, is an artifact, a human creation.” Not only do maps show what is valued by the mapmakers, like the archaeologists’ different gravesite maps, the place names show how limited we are by our own perceptions and language. Because we so struggle to understand the mysteries of nature, we easily personify them or cast them as metaphor. Even names of cave formations reveal this process: cave popcorn, cave bacon, draperies,
soda straws, cave pearls, fried eggs. These formations look like what their names suggest (in luminous earth tones), yet they are infinitely more beautiful.

It’s all a self-made deception. Like the 2-year-old who looks up to a luminous full moon and proclaims “ball!” we are limited, not only by our frail grasp of understanding, but by our language as well. The natural world is far more beautiful than the poor pictures our adjectives, nouns, and metaphors can portray, however well chosen the words may be. And it’s a twofold duplicity. For not everyone sees giants in the Hall of the Giants at Carlsbad Caverns. How would you navigate a map that reads “turn right at the giant”? Would you see it? In this sense, cave maps with fanciful place names can be particularly dangerous. Cavers are taught to look back when they explore, because upon exiting, the features of the cave will look different. A single source of light, from a different angle, could turn a formation called “the dwarf” into something totally unrecognizable.

But even after realizing these two deceptions, there is a darker secret to be discovered. What we see in the cave with our lights is not the true cave. Even a precise map, with survey shots and topographical information, does not show the true cave. I’ve been lost in a cave with no working lights and I know. The true cave is as dark and one dimensional as a piece of black construction paper. Our lights are foreign substances to it. The true cave is formless. It is blank. It is supremely indifferent to our perceptions of it.

The Edge

We had reached the edge of our limits and the edge of the map. We were too tired to dig anymore and started the long process out. We traced our footsteps back through the soft, Peter Rabbit warren; slogged through mud-like clay; walked along a crevice; followed the joints and fractures of the cave back to the maze; and clamored up the breakdown boulders.

When nearing the exit of a cave, the first thing to notice is the air movement, cool and fresh. Then the twilight zone emerges, hazy and soft, like the light you see when you’re caught between being half awake and still half submerged in a dream. Climb topside and your senses, which have been deprived for so long, suddenly bombard you with beauty.

The air smells different—alive with a thousand variations of grass, dirt, and breeze smells. The view will have changed. Shadows will have grown longer, or clouds may have formed. Stars may have come out or the moon may be so full and heavy laden on the horizon that you think it could roll down into your arms. After a day of silence, the sounds outside descend upon the ears in a symphonic scale. A lone cicada will sound as loud and true as any brass practicing in an empty concert hall.

We climbed up the cable ladder to the surface of Powell’s, regretful we hadn’t accomplished much, yet supremely grateful to be surfacing.

But long after midnight, we discovered a team hadn’t exited the cave.

“Where is Team 6?”

“They haven’t come up yet.”

“They must have found a good lead.”

“Or got lost.”

There was gentle laughter edged with nervousness.
“Where were they going?”
“They were looking for a connection between HH47 and TCB20, near Hell-Hole.”

These survey marker names were pointed to on the map, and the possible routes of the team were traced and highlighted.

“Team 2 said there’s really bad air at the bottom of the dig next to the stream passage. They had to turn around.”

“Well . . . someone murmured. “We’ll wait another hour or so, then I guess we’ll have to go down and see what they’re up to.”

We huddled up top by the cave entrance, a 7-meter vertical shaft in the flat plain. The air was still, almost oppressive. A summer night in west Texas is like being on a vast, earthy plate still cooling from an oven. Stars splash above it in vivid patterns you swear you have never seen before, or think you never will again. When the coyotes howl it seems they are beyond the edge of the world, surely falling . . . or leaping over the plate’s rim, taking their sad decrescendos with them.

On the western horizon, we saw a blackness eating at the stars. A storm was moving in.

Again, the map was unrolled. And again, I felt fearful of its duplicity. I wondered if Team 6 had had the same unfinished map as our team had. Perhaps their survey marks weren’t included. Or perhaps they had a handwritten note using place names such as “turn left at the Totem Pole,” only the formation looked more like the “Witch’s Finger” to them.

But at 1:00 a.m., I heard movement far below us and the sound of muffled voices. Team 6 finally emerged, popping their heads up to the surface just as the storm was approaching.

The smell of dirt and sweat came up with them. They smiled exuberantly while mud clung to their hair in clumps, lined the crevices of their ears, nostrils, the rims of their helmets. The fine, white limestone powder of the cave’s upper level had crusted over the earlier-acquired darker dirt, giving their skin the appearance of burnt biscuits rolled in sugar.

“We got lost but found a new lead and dug it until we hit a sump.”
“Looks like you were digging with your face, man.”

There was good-natured ribbing while the teams walked quietly through the night to their tents. Someone pointed a flashlight straight to the sky, enticing moths to flutter through the beam. Eastern pipistrelle bats began to swoop down, as surprising as moon shadows, to snatch at the meal and disappear by the time I could blink.

“Twelve more survey shots were put in,” I heard someone murmur.

Quick sketches were made on the open draft. If the cave was going, it meant the new leads were working out and the known cave length getting longer. These new survey shots would be added to a computer-generated map of the cave, done by a program called WALLS. This cave-surveying program creates multicolored plots, draws in the cave walls, adds 3-D views, and implements a statistical system to trou-
bleshoot difficult surveys. It is accurate, scientific, and coldly mechanical. There are no doodles of sea serpents in unnamed oceans or elephants in the blank spaces of Africa’s interior. No warnings of dragons. No shells on palm fronds, marking far-away islands floating like dreams under blue Pacific skies.

And I felt a sadness. The blank spaces on maps are already filled with things we can’t see—the grand mysteries of the world. We need a few dragons. We need to leave some things unnamed. Searching for such spaces may be fine and well, some may say even noble, but what is truly noble is recognizing our smallness in the world. Gusts of air may guide us to hidden secrets. Computer programs may spout out map after map. Satellites whirling in orbit at 17,000 miles per hour may zing our coordinates to a computer chip held in our palms. Locations and lines and roads and radio waves are webbing all over the world—a luminous weave running astray. But what is the earth itself but a small life-ship spinning through an endless space of unmapped voids? The universe itself is blank. Dark. Supremely indifferent. Where are we in this?

Those blank spaces on maps, what few there are remaining, should teach us to recognize our false control over our environment. They are testimonies to our frailty, and demand humility. They need to stay empty, unknown . . . and sacred.
I welcome the opportunity to reconsider the analysis of Marx and ecology in my essay “Marx’s Inorganic Body” (Clark, 1989) and to discuss John Bellamy Foster and Paul Burkett’s (2000) recent article in which they commented on that analysis. In general, I find that my interpretation of Marx in that essay was based on a careful and I think quite plausible reading; however, I now find it to be rather limited and one-sided. I am happy to be able to comment on how I would now broaden and revise that interpretation.

I would also like to comment on Foster and Burkett’s (2000) criticisms of my position in the article. Although I have many differences with Foster and Burkett on central issues in philosophy and social theory, many of the views that they attribute to me are not the ones that I actually hold. One of my strongest interests is the development of a critical and radically dialectical political ecology. It has never occurred to me that this goal could be furthered by rejecting “political action and education” for the sake of “personal redemption, ritualistic behavior, the denigration of human will, and the virtues of human irrationality” or by adopting “self-effacement, passivity, and obedience to the ‘laws of nature’ that are held to be supreme over the claims of human activity and praxis” (p. 421). Yet, Foster and Burkett used precisely these terms (quoted from Murray Bookchin) to typify the kind of “mystical ecology” that they attributed to me. Also, contrary to Foster and Burkett’s contention, I do not support “the view that one can only be dialectical by being nonscientific” (p. 422).

To clarify my view of Marx and ecology, I would like first of all to point out what I see as certain divergent tendencies in Marx’s thought; second, to analyze the meaning of teleology in philosophical discourse; third, to discuss the issue of essentialism; and finally, to comment briefly on the significance of the term inorganic body.

RECONSIDERING MARX’S ECOCOLOGIES

In the essay in question (Clark, 1989), I depicted two Marxes: a “Promethean” one who is dominant in Marx’s thought and a more dialectical and ecological one who remains primarily implicit. Today, I would stress the mutual coexistence and interaction within the Marxian corpus of (at least) three Marxes who are relevant to ecological concerns. First, there is the Promethean Marx, who was strongly emphasized in “Marx’s Inorganic Body.” Second, there is a managerial environmentalist,
systems-theoretical Marx. This Marx was mentioned in “Marx’s Inorganic Body” but was merged with the former one, thus minimizing his contributions to the environmental management, ecological stewardship tradition. This is the Marx discussed almost exclusively by Foster (2000) and Burkett (1999). Third, there is the implicitly ecological, radically dialectical Marx. This Marx was analyzed in “Marx’s Inorganic Body” but underemphasized in part on ideological grounds that I would now reject. I still see this third dimension as primarily latent and implicit in Marx’s thought but as being of growing practical historical importance. Foster and Burkett (2000; see also Burkett, 1999; Foster, 2000) show little awareness of the existence of this Marx and appear to think that the managerial environmentalist Marx is the true and fully ecological one.

However, it seems to me that Foster and Burkett (2000; see also Burkett, 1999; Foster, 2000) do little if anything to exorcize the Promethean Marx. The fact is that there are real tensions and contradictions in Marx’s thought. In particular, there is a conflict between his critical and dialectical methodology and his liberatory project on one hand, and his commitment on the other hand, to varying degrees at various times, to centralist and statist politics, to technological utopianism, to patriarchal values, to the mystique of industrialism, and to Eurocentric ideology.

Neither Foster nor Burkett (Foster & Burkett, 2000; see also Burkett, 1999; Foster, 2000) directs his attention to such enormous philosophical issues as the question of technological domination and the possible contradiction between praxis and self-determination on one hand, and the growing ascendancy of technique on the other. They do not seem to recognize in any way the problematic character of Marx’s (1857/1973) view (discussed in “Marx’s Inorganic Body” [Clark, 1989]) of the progressive nature of industrial development in which the technological system becomes a vast automated machine, and

the human being comes to relate more as watchman and regulator of the production process itself. . . . No longer does the worker insert a modified natural thing [Naturgegenstand] as middle link between the object [Objekt] and himself; rather, he asserts the process of nature, transformed into an industrial process, as a means between himself and inorganic nature, mastering it. He steps to the side of the production process instead of being its chief actor. (p. 705)

Yet, such productionist tendencies are an enduring current in Marx’s thought and, combined with the statist and centralist policies that he advocated for the transition, pose problems for his vision of a realm of freedom and self-determination.

Despite their charges of “idealism” against those who find evidence of a Promethean Marx, Foster and Burkett’s (2000; see also Burkett, 1999; Foster, 2000) own method of interpretation seems to lapse into idealism in neglecting the ways in which the real conditions of his society, the political movements in which he participated, and his own life shaped Marx’s ideas. For example, Marx was not immune to the influences of a patriarchal society in constant rebellion against the feminine, he personally had intense feelings of being dominated by his own mother, and he identified strongly with his father (Seigel, 1978, pp. 47-59). Foster and Burkett (2000; see also Burkett, 1999; Foster, 2000) do not confront the evidence of patriarchal ideology in Marx’s thought, including the ways in which his image of humanity’s relationship to nature is influenced by this ideology.

I think that Foster and Burkett (2000) dismiss too lightly my suggestion that Marx’s view of nature exhibits a certain antagonism toward nature and the “natural” (i.e., precivilized) community as limiting maternal powers, that there is an Oedipal
current in his thought, and that this current is manifested in Marx’s (1867/1967) statements that “Where Nature is too lavish, she ‘keeps him in hand, like a child in leading-strings.’ She does not impose upon him any necessity to develop himself” (p. 513) and his view that “primitive man” suffers from a “narrowness” in social relationships, because he “has not yet severed the umbilical cord” that ties him to the “primitive tribal community.” (p. 79)

For Foster and Burkett (2000; see also Burkett, 1999; Foster, 2000), the possibility that Marxism could function as productionist, technobureaucratic ideology (tinged with patriarchal and Eurocentric influences) cannot have a significant basis in Marx’s own thought. To refute this possibility, they generally fall back on the fallacious line of argument that because (a) Marx held a metaphysical theory (historical materialism) that recognized humanity as an integral part of nature; (b) he criticized capitalism harshly for abusing the land, upsetting natural cycles, and so forth; and (c) he believed that such abuses should not take place and indeed advocated an ideal society in which they would not take place; consequently, (d) Marx could not himself have held basic theoretical positions that are antiecological and (e) he could not have himself consistently advocated political, economic, and technological policies that are ecologically unsound.

Burkett (1999) at least recognizes that “certain passages in Marx and Engels’ writings seem to espouse an industrialist vision of revolution with questionable ecological connotations” (p. 14). He does not, however, inquire whether there is any systematic nature to these passages, and tellingly, he spends very little of his 300 pages of analysis on Marx’s theories of revolution and social transformation and on the crucial problem of the transition, concentrating instead overwhelmingly on Marx’s critique of capitalism and on his vision of a future communist society.

Foster (2000) and Burkett (1999) do, however, make a real contribution to the study of Marx and ecology. They show that Marx went much further in presenting an environmental stewardship or management view than I and a great many other commentators have recognized. This is demonstrated very well in Burkett’s (1999) exhaustive documentation of passages in which Marx discusses topics such as soil conservation and pollution. I am grateful to him for his careful scholarship and for correcting a shortcoming in my analysis and in that of many others.

What I do not find in either Foster’s (2000) or Burkett’s (1999) discussion is any application to ecological questions of the kind of radically dialectical analysis that Marx applies to the capitalist system and to human nature under that system. In fact, many of Foster and Burkett’s (2000) own citations of Marx demonstrate the ecologically problematic nature of his outlook. For example, in defense of Marx’s ecological qualities, Foster and Burkett (2000, p. 416) cite his statement that

from the standpoint of a higher economic form of society, private ownership of the globe by single individuals will appear quite as absurd as the private ownership of one man by another. Even a whole society, a nation, or even all simultaneously existing societies taken together, are not the owners of the globe. They are only its possessors, its usufructuaries, and like *boni patres familias* [good heads of the household], they must hand it down to succeeding generations in an improved condition. (Marx, 1894/1959, p. 776)

It is true that this passage exhibits a stewardship outlook that conflicts with ideas of untrammeled, irresponsible human domination of nature. But, it certainly does not exhibit an ecological conception of the place of humanity within nature. Indeed, it expresses the idea that human beings can “possess” the earth, a concept that is both
arrogant and absurd from an ecological point of view. Moreover, it depicts humans as the heads of the planetary household (the *oikos*), and patriarchs at that.

Despite what I now see as the one-sidedness of “Marx’s Inorganic Body” (Clark, 1989), that article had the merit of proposing the possibility of a strongly dialectical, ecological Marx as the alternative in Marxist theory to the Promethean and managerial stewardship views. My view was (and remains) that the ecological dialectic remained primarily implicit in Marx’s thought and that “to develop the submerged ecological dimension of Marx would mean the negation of key aspects of his philosophy of history, his theory of human nature, and his view of social transformation” (p. 250), including the elements of “productivism and instrumentalism” still espoused by some in Marx’s name.

Although Marx did not develop the ecological dialectic, more than any other modern philosopher, he offered suggestions concerning the ways in which a nonidealist, historically grounded dialectic might be applied to the relationship between humanity and nature. Fortunately, many theorists have taken up the challenge over the past decade or more and have developed a sophisticated ecological Marxism that overcomes the limitations of orthodox Marxism and goes far beyond the environmental management view that Foster and Burkett (2000; see also Burkett, 1999; Foster, 2000) defend.

3

“THE HISTORICAL STRUGGLE BETWEEN MATERIALISM AND TELEOLOGY”

In their discussion of my views and those of others concerning the subject of teleology, Foster and Burkett (2000) assume that any teleological conception must be crude, irrational, and antiscientific. Their view of teleology is epitomized in the dictum that they quote from Aristotle: “Man alone of all the animals is erect, because his nature and his substance are divine.” However, there is, in addition to this regressive outlook, another more naturalistic side to Aristotle’s teleology, inspired by his empirical observations as a biological scientist. And, although Voltaire ridiculed teleological thinkers for marveling at such facts as that the nose is so perfectly designed to support spectacles, he also proclaimed Epicurus worthy of mockery for failing to recognize the reasonable uses of teleological explanation.

In short, I think that Foster and Burkett (2000) have a rather oversimplified view of the matter. I would therefore like to discuss briefly the ways in which their discussion of teleology tends to mislead the reader, insofar as it does not take into account contemporary philosophical discussion of this concept, in addition to presenting a one-sided depiction of its meaning throughout the history of philosophy back to Aristotle.

Interestingly, Foster (2000) praises the eminent evolutionary biologist and philosopher of science Ernst Mayr as “one of the foremost contributors to the neo-Darwinian synthesis” (p. 186) and invokes Mayr in criticizing essentialism. Yet, Foster and Burkett (2000) ignore Mayr’s (1988) careful analysis of the ways in which teleological explanation is important to contemporary biology. Mayr noted that teleological language “is frequently used in biology in order to make statements about the functions of organs, about physiological processes, and about the behavior and actions of species and individuals” and that “many biologists have continued to insist that such teleological statements are objective and free of metaphysical content” (p. 38). For Mayr, there are two kinds of “end-directed processes” in nature: “teleomatic processes in inanimate nature,” which are “end-directed only in a passive, automatic way, regulated by external forces or conditions” (p. 44), and
more significantly, “teleonomic processes in living nature,” in which a process “owes its goal-directedness to the operation of a program” (p. 45). Biological systems are of the latter kind (p. 53). Finally, Mayr argued that teleonomic explanations are not only rationally admissible but also scientifically necessary in order to make meaningful statements about certain biological processes (p. 55).

Furthermore, Foster and Burkett (2000) overlook discussions of teleology in contemporary ecological philosophy. The greatest contribution in this area has been made by Holmes Rolston (1988), one of the most widely recognized and influential contemporary ecological philosophers. According to Rolston,

something more than causes, if less than sentience, is operating in every organism. There is information superintending the causes; without it the organism would collapse into a sand heap. This information is a modern equivalent of what Aristotle called formal and final causes; it gives the organism a telos, “end,” a kind of non-felt purpose. Organisms have ends, although not always ends-in-view. All this cargo is carried by the DNA, essentially a linguistic molecule. (p. 98)

An organism, Rolston says, has “a good-of-its-kind; it defends its own kind as a good kind” (p. 101).

Whether the details of Rolston’s (1988) and Mayr’s (1988) reconceptualizations of teleology are convincing or not can certainly be debated. Nevertheless, it is not helpful to discuss contemporary concepts as if there has been no development of thinking on this topic since scholastic versions of Aristotelianism or to contend that those who utilize the concept are in some way antiscientific.

Finally, Foster and Burkett (2000) do not consider the meaning of the term teleology in ethical theory, a meaning that is quite relevant to the analysis of Marx’s thought in “Marx’s Inorganic Body” (Clark, 1989). There are two main branches of ethical theory. The first, deontological ethics (from the Greek deont, “that which is binding”) focuses on one’s duty to do what is right. Deontological theories stress such concerns as justice and fairness, obedience to moral or natural law, respect for persons, and faithfulness to agreements and contracts. The second, teleological ethics (from the Greek telos, “end,” and teleios, “perfected”) focuses, on the other hand, on some ultimate (or intrinsic) good that can be attained through one’s action. One branch of teleological ethics is consequentialist or utilitarian theory, which defines the good in terms of the maximization of pleasure, happiness, satisfaction, interests, or choices. The other major branch defines it in terms of self-realization, sometimes as the achievement of virtues or excellences, but more generally as the actualization of the highest potentialities for oneself and for other persons (or beings).

Recent forms of ecological teleological ethics focus on holistic or systemic processes of self-realization, in which this realization applies not only to human beings, or even to organisms, but also to larger natural and biological realities such as ecosystems, species, and even the biosphere. To relate Marx to this tradition is in no way to link him to the sort of teleological irrationalisms that Spinoza, Voltaire, and many others in modern philosophy demolished long ago. It is rather to say that the dialectical and holistic dimensions of Marx’s thought have an important relationship to the most promising tendencies in contemporary environmental ethics and that they can make a highly significant contribution to the field if these dimensions are fully developed.
THE ESSENTIALIST KARL MARX

In responding to Foster and Burkett’s (2000) claim that I advocate essentialism, my first thought was to explain that I am not an essentialist and why I am not. My second thought was to take a more dialectical approach. Although I believe that a dialectical analysis must reject essentialism, I think that if it is to avoid deteriorating into the kind of superficial antiessentialism that is so prevalent today (particularly in postmodernist discourse), it must also grasp the truth of essentialism.

So first, I would like to show that every essentialism is not quite so absurd a viewpoint as Foster and Burkett (2000) implied. For example, Nussbaum (1992) argued cogently that to defend a conception of social justice, it is necessary to accept certain qualities as “essential” to the definition of human functions and the human good, an approach that she held to be “emphatically not metaphysical” (p. 215). Specifically, Nussbaum discussed such human qualities as mortality; embodiedness; the need for food, drink, and shelter; sexual desire; mobility; the capacity for pleasure and pain; cognitive capabilities; early infant development; practical reason; relatedness to nature and other species; humor and play; and separateness as relevant to developing what she called a “thick vague conception” of the human being and the human good.

It would seem that Marx at least sometimes adheres to similar “essentialist” views when he describes the human essence, species beings, and basic human needs in ways that imply certain norms on the basis of which to judge economic exploitation, various forms of alienation, or the fetishism of commodities to be detrimental to a human being. Thus, Nussbaum (1992) contended that various statements by Marx, such as “assume the human being to be the human being and its relations to the world to be a human one, then you exchange love only for love, trust only for trust, etc.” imply a definition of humanity in terms of certain functions and a concept of dehumanization through the alienation or commodification of these functions (p. 231). In her view, it is impossible to make claims about the exploitation, dehumanization, or alienation of human beings unless one has a conception of what constitutes full humanity or the good for human beings.

On a certain level, this seems quite reasonable, and I see no reason why such an essentialism should be linked to various absurdities, as Foster and Burkett (2000) contended. Nevertheless, I think that essentialism must be rejected on a more fundamental ontological level. I did not endorse essentialism in my 1989 article, but the discussion there badly lacks clarity on this issue. Although I cited on behalf of the ecological Marx his antiessentialist, dialectical statement (Marx, 1844/1974) that “a being that does not have its nature outside itself is not a natural being” (p. 135), my citation of Meikle (1985), who accepts essentialism, does not make clear what in his view I accepted and what I rejected. I now see an explicit critique of essentialism as central to dialectical analysis. In a summary of the meaning of a dialectical social ecology (Clark, 1997), I suggested that a dialectical perspective “refuses to objectify, reify or absolutise any whole, including the whole of nature,” and that it is “an apprehension of the conditioned reality of all phenomena that drives dialectical thought to an affirmation of both the being and non-being of all objects” (p. 14).

I agree with Adorno’s (1973) depiction of dialectics as “the consistent sense of nonidentity” (p. 7) and would argue that a dialectical analysis destroys any concept of an enduring substance with essential attributes, as has been posited by the dominant Western metaphysical tradition. The dialectical doctrine of internal relations
also undermines the concept of discrete entities that can be defined by qualities that they possess “in themselves,” to use the terminology of Western dialectics, or “from their own side,” to use that of Madhyamika dialectics. Conventional thinking continually commits the error of finding a substance with essential qualities where there are in fact diverse phenomena. This occurs, for example, in the case of those who do not have to look very carefully at diverse theories because they have grasped the essence of teleology, or even the essence of essentialism.

Nevertheless, even in the absence of identity and substantiality, the phenomena in nature exhibit a distinct movement toward actualization of form. Living beings, although they are not substantial entities, have “a good,” as ecological philosophers often point out. But development of form is inseparable from the dialectical interaction between phenomena and is in no way a mere unfolding of potentiality within the isolated history of some reified being. And form itself is only meaningful through its difference, its constitution by the other. Determination is—in the most radical sense—negation. This is itself an ecological concept, as Rolston (1988, pp. 186-189, 220-225) has attempted to develop in part in his theory of “systemic value.”

Interestingly, although I ultimately reject essentialism, Foster (2000) explicitly espoused it and invoked Marx on its behalf. According to Foster’s interpretation, Marx rejected essentialism “apart from the practical, transformative nature of humanity itself, as homo faber” (p. 113). A strict antiessentialist could perhaps say that the essence of humanity is to be in a condition of constant transformation, for this would be a paradoxical statement that the essence of humanity is to have no essence. But, to affirm humanity’s essence as homo faber is to define it as a being whose enduring characteristic is to transform the objects of its activity for practical purposes.

It is noteworthy that the one form of essentialism that Foster (2000) seems to accept expresses precisely the view of humanity that ecological critics of Marx have seen as problematic. It privileges the materially transformative and technological activities at the expense of all other aspects of human nature. Marx was hardly unique among classic modern thinkers in placing heavy emphasis on such activities. However, it is now possible to see that the privileging of such activities over others such as communication, imagination, symbolization, poesis, and play has been central to the perpetuation of the real, material antagonism between humanity and the natural world.

It is not difficult to quote passages that produce either a dialectical Marx or a mechanistic one, a humanistic or a structuralist one, a libertarian or authoritarian one, a Promethean or an environmentalist one, and so on. It is a bit more challenging to see the phenomenon of “Marx” in all its complexity and diversity. What is most difficult is to understand how the diverse currents within Marx’s thought interrelate, reinforce, modify, and indeed contradict one another, how they constitute a relative whole, and how they subvert this whole. Yet, this is exactly what dialectical critique needs to do.

MARX’S BODY REVISITED

According to Foster and Burkett (2000), “today’s Green theory” has an overwhelmingly “romantic, vitalistic, and spiritual character” that leads it to make “crude, even meaningless” distinctions between the “organic” and the “inorganic” (p. 405). In line with this crudeness, “contemporary ecological critics commonly claim that in referring to man’s inorganic body, Marx created a dualistic conception
of the human-nature relationship in which human beings and nature exist in perpetu-
al antagonism” (p. 405). Thus, on the entirely insubstantial grounds of Marx’s use
of ecologically incorrect terminology, I and other critics make such science fiction-
lke claims as that Marx thought “that human beings are not really part of nature,”
that he believed that humans could “escape [nature’s] laws, which do not pose lim-
its to humanity,” and that he believed in “the almost infinite capacity to manipulate
nature for human ends through the development of technology” (p. 405).

I find some problems in Foster and Burkett’s (2000) method of textual exegesis
on behalf of such claims. For example, they stated that “for Clark,” Marx’s distinc-
tion between organic and inorganic body “offers definitive proof of the anti-
ecological character of Marx’s thought, simply because nature [italics added] (out-
side the human body) is characterized as man’s inorganic body [italics added]”
(p. 405). They then noted that “as Clark himself puts it,” although “a mere distinc-
tion between two such realms within material nature is not, obviously, in itself an
ontological false step, the valuation underlying the distinction is another ques-
tion” (p. 405). They also cited my comment that another statement of Marx exhibits
“a highly distorted body consciousness” (p. 406). But, Foster and Burkett over-
looked the fact that the very next sentence states that

perhaps we should not be so hasty in tearing apart the Marxian corpus. As Words-
worth warned us about the impetuously analytical mind, “we murder to dissect.”
Instead, we should look at the whole of Marx’s conception of nature, and its rela-
tion to his larger problematic. (Clark, 1989, p. 243)

These citations indicate my actual methodology. It is not to judge Marx on the
basis of some naive conception of ecologically correct use of words but rather to
assess his analyses and his valuations of nature within this larger context. An exam-
ple of the complexities that I find in Marx’s discussions of nature and the body may
be helpful.

Foster and Burkett (2000) might in some ways have strengthened their case by
citing the following passage, with its seemingly ecological and dialectical opening
words. However, it soon becomes evident to the critical reader that it demonstrates
the conflicting tendencies in Marx’s thought. Marx (1867/1967) stated that

labor is, in the first place, a process in which both man and Nature participate, and
in which man of his own accord starts, regulates, and controls the material re-
actions between himself and Nature. He opposes himself to Nature as one of her
own forces, setting in motion arms and legs, head and hands, the natural forces of
his body, in order to appropriate Nature’s productions in a form adapted to his own
wants. By thus acting on the external world and changing it, he at the same time
changes his own nature. He develops his slumbering powers and compels them to
act in obedience to his sway. (p. 177)

In this passage, we see expressions both of Marx’s ecological, dialectical side and
also of his Prometheanism. What is ecological and dialectical is that humanity is
recognized as being part of nature, as interacting with nature, and as being changed
in the process of interaction. These are exactly the aspects of Marx’s thought that
can be developed in a fully dialectical ecology. Yet, there are distinctly non-
dialectical aspects to the account to the extent that it neglects the mutuality and
cooperation between humanity and nature in production. “Man” is undialectically
abstracted from nature in the assertion that he acts “of his own accord,” for he in fact
acts out of needs and instincts that he does not choose to have (as Marx recognizes in some contexts). It is also important to stress the extent to which in any process of production, humanity does not regulate and control the “material reactions” if we are not to develop illusions about the extent of humanity’s powers over nature or ability to control it. Finally, the image of “man” or, more precisely, the active, controlling side of “man” first “setting in motion” his physical, bodily part and then “compelling” his natural powers to act according to his “sway” bears unmistakable marks of a dualistic, patriarchal image of human nature. Note that “he” sets in motion “the natural forces of the body,” a depiction that poses the question of what, precisely, thinking, willing, having impulses and feelings and other “mental phenomena” may be, if not “natural forces” (not to mention, “of the body”).

If Marx is understood within his historical, social ideological, and social imaginary context, it is not surprising that he would exhibit such conflicting tendencies; yet, the limitations of his outlook must be recognized rather than explained away.

CONCLUSION

I stated in one early essay (Clark, 1977) that although it is possible to construct a Marxism that ignores “the implications of [Marx’s] critical and dialectical methodology,” nevertheless, “it may very well be impossible to pursue the anarchist project—the critique and transcendence of all forms of domination—without adopting this aspect of Marx’s position” (p. 65). What makes Marx, for all his limitations, the greatest modern philosopher of liberation are his groundbreaking contributions to the critique of ideology, to the dialectical analysis of society (and of capitalist society in particular), and to the project of developing a liberatory social praxis guided by critical and dialectical thought. Although Foster and Burkett (2000) seek resolute consistency in defense of what seems to me to be a less than ecological interpretation of Marx’s materialism, they are quite inconsistent in carrying on and extending Marx’s critical and dialectical project. As a result, their interpretation of Marx and their response to my critique of Marx seem often to be more apologetic than critical, and their Marxism seems to be more managerial and environmentalist than dialectical and ecological.

NOTES

1. Foster and Burkett (2000) claimed that in “Marx’s Inorganic Body” (Clark, 1989), my discussion of Marx and nature is hampered by the fact that [my] references to Marx’s writings in this area are drawn entirely from a collection of excerpts provided by Howard Parsons’ (1977) book, Marx and Engels on Ecology. Clark (1989), it would seem, has no direct knowledge of Marx’s (1976) Capital itself. (p. 420)

Yet, in the relatively brief article in question, there are in fact 31 references to primary works of Marx (11 to the Paris Manuscripts, 10 to the Grundrisse, 5 to Capital, and 5 to other works), in addition to the 11 references to Parsons’s (1977) Marx collection. All except one of the Parsons citations appear early in the article, in a discussion of Parsons’s own interpretation of Marx. Although I would now revise it in line with some of the points made here, I presented a detailed critique of Marx’s thought on the basis of extensive examination of primary texts some time ago. My views were first summarized in a lengthy paper (Clark, 1977), on which a later article (Clark, 1979) and several chapters of the book The Anarchist Moment: Reflections on Culture, Nature, and Power (Clark, 1984) were based.
2. The ideological distortions, which cannot be analyzed adequately in this brief discussion, can be traced to my commitment (albeit an increasingly uneasy one) at the time to a sectarian, Bookchinite, anarcho-communist politics. Ironically, Foster and Burkett (2000) quoted Bookchin against me for expressing views that were very much influenced by his outlook. Bookchin’s highly partisan conception of social ecology, which I now consider to be dogmatic and nondialectical, demands an exaggeration of differences from what are seen as competing leftist perspectives and a strong emphasis on the shortcomings of those perspectives, and excludes sympathetic interpretations and the search for common ground. I have also reconsidered my interpretation of Marx in the light of the highly developed forms of ecological Marxism and ecosocialism that were soon to emerge (marked especially by the establishment that same year of the journal *Capitalism, Nature, Socialism*, which was to become the arena for the most important contemporary work in radical political ecology) and undergo an extraordinary development over the subsequent decade. At present, if social ecology is defined as a dialectical theory of the relationship between humanity and nature, much of the most serious, constructive work in that field is being undertaken within the socialist tradition, and the implicitly ecological dimension of Marx is being developed in highly significant ways (though usually with much more recognition of Marx’s deeply nonecological dimension than Foster and Burkett are willing to see).

3. See in particular the articles in the “Marxism and Ecology,” “Ecological Socialism,” and other theoretical series that have appeared in *Capitalism, Nature, Socialism* over the past decade, including especially Kovel (1995) and O’Connor (1999).

4. The early chapters of Lewis Mumford’s (1967) classic work on the history and philosophy of technology, *Technics and Human Development*, are devoted to a refutation of this image of human nature.

5. Burkett (1999) and Foster (2000) have attempted to defend Marx from charges of productivism, but there are abundant examples of productivist assumptions in their own works. In a notable instance, Burkett (1999) asserted the productivist tenet that the development of industry under capitalism “negat[es] the material-scarcity rationale for class exploitation” and thereby also “negates the historical necessity of such social antagonisms and restrictions” as stand in the way of human development (p. 172). According to this view, scarcity is not a social artifact, a relational phenomenon created and legitimated ideologically under capitalism, but is rather an objective condition, a fact of nature, a materially based problem that could only be solved through the advances in production achieved under capitalism. However, as Sahlins (1972) and others have shown, early societies in which production was closely tied to use and in which gift exchange was practiced were based neither on a social reality nor on a collective mentality of scarcity, and there is no evidence that the much greater levels of production attained in later precapitalist societies were not adequate, if placed within the context of suitable liberatory forms of social organization, to escape the quite “unnatural” scourge of scarcity.

6. I find that “Marx’s Inorganic Body” (Clark, 1989) stayed primarily on the second level and contributed little to the third. On the other hand, Foster and Burkett’s (2000) project required them to remain in general on the first level. Habermas (1971), I think, presented a good model of the third level of analysis when he stated that there is

in Marx’s works a peculiar disproportion between the practice of inquiry and the limited philosophical self-understanding of this inquiry. In his empirical analyses Marx comprehends the history of the species under categories of material activity and the critical abolition of ideologies, of instrumental activity and revolutionary practice, of labor and reflection at once. But Marx interprets what he does in the more restricted conception of the species’ self-reflection through work alone. (p. 42)

7. Foster and Burkett (2000) themselves apparently see nothing problematic in attributing to Marx the view that “human beings are active, living, transformative creatures in charge of their own bodies and drives” (p. 411). Yet, this depiction sounds less like a dialectical
account of human nature than like Freud’s dualistic account of what human beings ought to be after instinctual life is brought under rational control—when, in his famous phrase (to which I alluded in “Marx’s Inorganic Body” [Clark, 1989]), “wo Es war soll Ich werden.” True, Marx qualifies the previous statement in a dialectical manner, but this does not dissolve the Promethean moment, which continues to coexist alongside contradictory moments in his thought.

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SUSTAINING MARX OR SUSTAINING NATURE?

An Ecofeminist Response to Foster and Burkett

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John Bellamy Foster and Paul Burkett’s article, “The Dialectic of Organic/Inorganic Relations” (2000) provides valuable exposition of Marx’s text on the humanity-nature relation. Marx’s materialism was a path-breaking exemplar of how to think about that vexed interface. Far too often, conversations about humanity-nature links elicit public confusion or intellectual hostility. For example, my own discipline of sociology is at a total loss when it comes to articulating the connection. Now, I take this to be an inevitable outcome of the industrial division of labour, under which form of social organization—a highly gendered one—people become alienated from the material ground that sustains their bodies and forms their sensibilities. My response to Foster and Burkett sets out to show how this alienation scars not only everyday life but theoretical production as well, including that of Marx. The more specific purpose of my comments is to aerate the charge of “idealism” that Foster and Burkett use against ecological critics of Marx. That discussion, in turn, introduces a fresh perspective on Marx’s “instrumental” attitude to nature, an aspect of his theory that they are keen to deny.

Foster and Burkett open their argument for Marx as an ecologist with a discussion of his allusion to nature as “man’s inorganic body.” They note how unpopular the word inorganic is in contemporary ecopolitical discourse, whereas organic is a privileged signifier among alternative life stylers and eco-metaphysicians. In a defence of Marx as an ecologist, Foster and Burkett develop this organic/inorganic dichotomy into a rhetorical dualism. Thus, on one hand, you have those who celebrate ecocentric holism in nature as “organic,” and on the other, you have those who celebrate the anthropocentric industrialising use of nature as “inorganic.” Foster and Burkett attribute Marx’s ecological critics with the first attitude and see them, in turn, attributing the second attitude to Marx. The critics are identified as the new physicist Fritjof Capra (1982); social ecologist John Clark (1989); political scientist Robyn Eckersley (1992); philosophers Kate Soper (1996), Val Routley (1981), and John O’Neill (1994); and ecofeminist Ariel Salleh (1997, 2000).

Although positions among these individuals often diverge markedly, Foster and Burkett bypass the detail, classifying the group uniformly as “one-sidedly idealist” in approach. Some of these ecopolitical thinkers will no doubt contest this summary judgment, as I will below. For the charge of idealism certainly does not apply to my own work, and their blanket categorization obscures more than it reveals about the other scholars named. Before debating Foster and Burkett, however, I want to emphasize the common ground between us. And, I will do this by situating our respective standpoints in the spectrum of current methodologies, materialist to ide-
alist. Foster and Burkett draw on Maurice Mandelbaum (1971, pp. 25-27) to amplify what they mean by materialism. To paraphrase, it will hold to the notion (a) of an objectively existing world, (b) of humans as materially embedded entities, and (c) of body and mind as an interacting unity. As I see it, these assumptions can be opened out into the following rough spectrum of methodologies on the humanity-nature problematic.

- **Position A**, that the world exists independently of human knowing, implies a realist ontology. In positing general processes such as thermodynamics or evolution, and variable factors such as locality, it assumes nature or society can be known directly using a positivist epistemology. The approach is basic to physics, biology, and an empiricist sociology but stands in marked contrast to the dialectical reasoning that Marx and Engels brought to materialism.¹

- **Position B**, that humans are embedded in the ground of nature and history, adopts a materialist and dialectical way of thinking, where ontology and epistemology are inseparable. In bridging biological and social phenomena, it applies praxis or historical judgment. The approach is basic to a political economy and to ecopolitical thought.

- **Position C**, that body and mind are a mutually informing unity, likewise adopts a materialist and dialectical way of thinking, where ontology and epistemology are inseparable. In tracing how ideas shape and are shaped by human action on the world, it applies self-conscious sociological reflexivity. The approach is basic to a critical and emancipatory theory of society.

A further methodology, beyond those implicit in Mandelbaum’s statement, is influenced by linguistic anthropology.

- **Position D**, that the world does not exist independently of human knowing, implies an idealist ontology. In positing social life as entirely constituted by discursive practices, it assumes that society—and the nature that it constructs—can only be known through deconstructive readings. The approach has become common in cultural studies and the new humanities.

Aside from an occasional unguardedly positivist reference by Foster and Burkett to “standard scientific usage,” I expect we would agree that Position A is not relevant to our discussion. We would also agree on the centrality of Position B, though I would highlight Position C as well, whereas they have little to say about this. We would probably agree in rejecting the idealist ontology of Position D but disagree on the usefulness of applying its deconstructive technique in a kind of soft constructionism or “critical realism.” Critical realists (Bhaskar, 1989) accept the material objectivity of nature, but on the understanding that knowledge of it is shared through the medium of socially constructed languages, ranging from everyday talk to disciplinary jargons. In sum, I think a consistently materialist scholarship should be comfortable with a dialectical relation between Positions B, C, and some D, as in this kind of triangulation, each approach or lens rounds out understandings of the other.

The fact that a qualified constructionism is not antithetical to Marxist analysis is demonstrated by the work of Bertell Ollman (1992).² His almost postmodern reading of Marx eases out seeming inconsistencies in the master text by showing how a variety of lenses, discourses, or levels of abstraction was used in his political econ-
omy for different purposes. Foster and Burkett follow a similar exegetical procedure in arguing that Marx’s unpopular wording on nature as man’s “inorganic body” should not be read as a denigration of nature’s value. And, I think that is fair enough.

A related issue, which they might also have raised in their defence of Marx, concerns the Comtian “hierarchy of the sciences” notion circulating in his day. This methodological scheme again distils a single material reality through a series of discrete disciplinary lenses, namely, mathematics, astronomy, physics, biology, and sociology, each offering a decreasing order of abstraction. Whereas Comte himself was a positivist, Marx, as a dialectician, moved easily between such discourses and their alternative formulations of the inorganic, organic, and so forth. Modern readers of Marx mostly lack that facility because 20th-century science undermined dialectical reasoning, consolidating the hegemony of positivist thought and identitarian logic.

Foster and Burkett (2000) maintain that Marx’s analysis, rooted in an evolutionary history of the human species, is essential to an adequate environmental ethic. This situates their thinking solidly in Position B. But, does it then background, or even omit, more critical sociological and cultural aspects of the humanity—nature dialectic—Positions C and D? I would say it does, judging from their reaction to my association of Marx with the “Great Chain of Being” ontology (p. 407). Foster and Burkett treat that as tantamount to saying Marx was influenced by medieval Scholastics. Their rebuttal is to trace his materialist intellectual lineage via Epicurus, Gassendi, and others, disavowing any connection between Marx and the Great Chain. Yet, they themselves locate the Great Chain ideology within Locke’s repertoire (p. 409), connecting Locke to Marx, in turn, in a footnote (p. 443, Note 10). These seeming inconsistencies aside, Foster and Burkett simply miss the point of my remark about the Great Chain of Being.

My intention is to emphasise how the cognitive absorption of ideas is only part of the intellectual production process. The culture of everyday life also informs the tacit assumptions that a theorist works with. The thrust and nuance of his or her thought may well take paths laid down by this mundane medium; the scholar, often unconscious of such influences, is then unable to deal with them in the reflexive way characteristic of Position C above. Foster and Burkett’s preference for working with Position B leaves them vulnerable in this respect. For in the absence of tools for analysing the cultural and psychological dimensions of social life, they may fall into a one-sided economic materialism. Over the years, many Marxists have dealt with this disciplinary blindness by using projection as a defence. In other words, lacking a language for recognising and articulating the embodied materialism of cultural processes, they write off any discussion of them as “idealist.”

But, culture is always relevant in fashioning the lenses scholars use. In particular, students of Marx need to interrogate his culturally determined decision to develop a theory of value exclusively around (men’s) productive industrial labour as distinct from (women’s) socially reproductive domestic labour. His selective focus was indicative of typically 19th-century patriarchal concerns—and the resulting theory, for all its explanatory power, should not be applied universally in an uncritical way. Examining traditional Eurocentric notions of “nature,” framed by the crude presociological belief in a Great Chain of Being, helps us move beyond Marx’s partiality. For this makes clear how the device of nature, pivotal to masculine/feminine, productive/reproductive dichotomies, has functioned as an instrument of domination. Elizabeth Dodson Gray (1979) first drew ecofeminist attention to the Great Chain ideology that informs the Judeo-Christian heritage. More important,
she spelled out its material objectification of women, and of nature, in social structure. Here is a status hierarchy of God’s domination over man and men’s domination over women, the darker races, children, animals, and finally wilderness. Moreover, men as God’s stewards in this ancient mythical covenant represent humanity proper, whereas lower echelons belong to the unclean sphere of nature. Mankind (meaning men) is accorded “rights,” and all the rest are “resources” at his disposal.

Western economics, law, science, religion, and even poetry and humour have all been built around this cultural (read political) metaphor. Eurocentric patriarchal and evolutionist ideas obtain de facto plausibility, even validation from its supposedly commonsense order of things. Its “natural rightness” is imprinted—that is materially embodied—with each generation by skipping around to the nursery chant “Farmer in the Dell.” One, two, three, four . . .

The farmer takes a wife, the farmer takes a wife,
High ho the dairyo, the farmer takes a wife,
The wife takes a child, the wife takes a child,
High ho the dairyo, the wife takes a child,
The child takes a dog, the child takes a dog,
High ho the dairyo, the child takes a dog,
The dog takes a cat, the dog takes a cat,
High ho the dairyo, the dog takes a cat,
The cat takes a mouse, the cat takes a mouse,
High ho the dairyo, the cat takes a mouse,
The mouse takes the cheese, the mouse takes the cheese,
High ho the dairyo, the mouse takes the cheese,
The cheese stands alone [in/organic nature], the cheese stands alone,
High ho the dairyo, the cheese stands alone.

The Great Chain of Being was an active condition of the culture that Marx lived in, and it continues to be a force in our time. Even so, although Marx’s thinking was not immune to its influence, there is no doubt that the logic of his political economy moves us toward emancipation from this oppressive grid. This is why many women scholars and activists are stimulated by his work.

The kind of socialist ecological feminism that I am interested in contributing to is a materialist sociology of knowledge, taking into account the embeddedness of human activity in natural and sociocultural conditions, Positions B and C above. This means recognising the ways in which most Western thought is race and gender blind and how race- and gender-marginalised knowledges are made invisible in everyday life and in theory. Conversely, Foster and Burkett tend to emphasise the seeding of concepts from one great White man to another—a form of intellectual history that operates as if those men were somehow untouched by their mundane life context as human beings. Ironically, although Foster and Burkett aim to expound materialist insights, this approach generates a rather linear idealist and nondialectical history of ideas sui generis.

The celebration, respect, and thoroughness that Foster and Burkett (2000) bring to their reading of Marx’s text are not extended to those they identify as Marx’s ecological critics. So, they judge their colleagues all too quickly, as this quote from their article reveals.

At issue in the standard critique of Marx’s organic/inorganic distinction then are two [sic] different and strongly opposed visions of ecological philosophy: one that
is materialist, historical, and essentially scientific in character; the other that derives its emphasis from mystical distinctions between anthropocentric and ecocentric and from spiritualistic allusions to nature’s teleology. From the latter standpoint, it is impossible to perceive the real class-exploitive alienation of nature. (p. 422)

The discursive strategy adopted here for defending the classical Marx is a reductive one. It pulverises a plurality of voices and reconstitutes them in a good/bad dualism. In the case of my own work, Foster and Burkett’s conclusion suggests to me that their reading of Ecofeminism as Politics (Salleh, 1997) was preoccupied largely with my passages on Marx per se, and in a way that disconnects that commentary from the book’s central theme. Their blanket charge of idealism certainly bypasses my plea for a 21st-century re-visioning of Marxism in terms of an “embodied materialism.”

In reply to their positivist assertion about dealing with “the real class-exploitive alienation of nature,” I will briefly outline the terrain of this ecofeminist re-visioning and its implication for “class” analysis. For when Foster and Burkett (2000) write, “What is needed . . . is a non-deterministic materialism and ecological humanism that recognise the dialectical linkages between humanity and nature” (p. 421), I wholeheartedly concur with them—and hope this dialogue moves us even further toward convergent understandings. The humanity-nature dialectic has been central to my ecofeminist work these past two decades. However, looking at the human material condition through a gendered lens, we see that the idea of “nature” implicates one half of humanity in a curious way. In other words, the tacit Great Chain of Being ideology and its reflections, such as Marx’s prioritisation of productive over reproductive labour, construct women as belonging not to “history” but to “nature.” Most ecopolitical thinkers have yet to grasp this fact, which is why ecofeminists are still trying to bring it to conscious awareness.

In theoretical terms, a gender-sensitive “embodied materialism” will work dialectically back and forth between human embeddedness in nature (Position B), reflexive self-awareness (Position C), and from the vantage point of each; it makes deconstructive readings (Position D) of earlier materialisms—including Marxism. Like other new social movements, ecofeminism privileges a politics of the body focused on sexuality, race, and environmental habitat. In this, it engages directly with the artificial humanity-nature divide. Marxist analyses of production and nature’s commodification also deal with this interface, but in ecofeminism there is a shift away from “production” toward “reproduction” in its several senses. In fact, the constructionist aspect of ecofeminism questions the very foundations of historical materialism, with its purportedly transhistorical concepts of history, nature, and productive labour. Offering a transcendent political critique, ecofeminism asks if there are not deeper causal structures, general processes, and particular contingencies formative of older gender-innocent Marxist understandings?

Moving across disciplines and Positions B, C, and D, ecofeminists see the humanity versus nature dualism, and the split between productive versus reproductive labours, reflecting a profound alienation. It is a split embodied in the social construction of masculine gender identity and in the social construction of its thought products. With this gender critique, ecofeminism comes forward as a remedial, transitional politics, appropriate to a certain historical conjuncture—the present. It reads deconstructively beneath the alienations that keep new social movements fragmented and focused on single issues, Position D. And, it invites ecopolitical activists and theorists of eco-Marxism, social ecology, or deep ecology to be more
reflexive about how their scholarship absorbs and reinforces profoundly gendered forms of alienation, Position C. In undertaking this task, ecofeminism operates as a sociology of knowledge.

An ecofeminist lens addresses the material reproduction of daily life as a priori to industrial production, and this will flow on to Marxist concepts of contradiction, class, and value, demanding new formulations. It follows that the book *Ecofeminism as Politics* (Salleh, 1997) asks eco-Marxists to reorient their thinking around the “deepest contradiction” underlying the capitalist organisation of production and its division of labour. This material contradiction is preserved in theory and in everyday life by socially pervasive but un-self-conscious Great Chain of Being assumptions. The deepest contradiction is materially embodied in masculine thought, in masculine practices and products. The objective expression of the contradiction is the economic marshalling of women and indigenes outside of humanity proper, and in the resource base of nature held at the disposal of industrialising men. These externalised groupings constitute an unspoken “class,” even though their reproductive labours are essential to capitalist economies. I use the term *meta-industrial class* to describe such people whose “labour” is considered “outside” of capitalism and is untheorised in Marxist class analysis, for example, domestic caregivers, peasant farmers, and indigenous hunter gatherers. Although culturally disparate, each grouping is involved in mediating material nature, and doing so in precautionary ways.

Class analysis aside, from a transcendent ecopolitical perspective, the uniquely sustaining character of the work that meta-industrials do points to a way out of ecologically destructive production. How is this? Materialist ecofeminists such as Mies and Shiva (1993; Shiva, 1989), Bennholdt-Thomsen, Faracas, & von Werlhof (2001), Terlinden (1984), Adam (1998), Ruddick (1989), and myself (Salleh, 1997, 2000) observe that under industrialisation, productive labours are inevitably “instrumental.” They cut across the metabolism of nature, breaking apart complex webs of biological interchange. By contrast, the character of meta-industrial labour is reproductive, attuned to the timings and cyclic transformations of nature—including our bodies. An embodied materialism highlights the relational, indeed dialectical, logic of reproductive labours and its unique sensibility, one might even say a people’s science, censored by the vanities of modernism. Nor is meta-industrial labour, as a process of human partnership with nature, necessarily gender specific. Ecological “holding” practices are found across genders among indigenous peoples. The gendering of reproductive labour as we know it is simply a historically contingent aspect of industrialised societies and their alienating division of labour.

In this analysis of meta-industrial skills, ecofeminism recognises a nonalienating way of objectifying natural human energies in labour and its potential for a long-term symbiosis of humanity-nature. With the notion of labour as a form of ecological holding, debate over Marx’s instrumental attitude to nature or otherwise becomes a sort of red herring. Industrially productive labour is intrinsically “instrumental” in relation to nature. Moreover, as I argue elsewhere (Salleh, 1997, 2000), this materialist restatement of the humanity-nature interface may be used to enhance political alliancing between ecology, gender, postcolonial, and worker struggles in an era of globalisation. I join Foster and Burkett in seeking a future based on self-managed communal provisioning. But, using an ecofeminist and, therefore, embodied materialist lens, I find the key labour base or vanguard of this “future” already active among the majority of people on earth today. Their meta-industrial work creates an articulation of the humanity-nature relation that is very
different from Eurocentric patriarchal notions of it. And, it is time that this alternative knowledge was heard in the conversations of political economy and addressed by solid Marxist scholars such as Foster and Burkett.

Textual exegesis is not enough to sustain Marx’s great contribution. As his own critical theses on idealism urge, materialism requires a dialectical cycle of theory and praxis, getting our hands dirty to test our understandings. In this respect, as English Marxist Nigel Lee (2001) put it recently in Capital and Class, ecofeminists “have taken some aspects of Marx more seriously than many Marxists” (p. 217). Grounded in grassroots political experience, ecofeminist thinking about labour broadens the emancipatory project by integrating gender equality, cultural diversity, and ecological sustainability. In doing this, it nurtures a common denominator for ecology, postcolonial, feminist, and socialist political struggles. Marxists must grasp that it is no longer simply a matter of “us versus them”; these new movements bring practical opportunities to verify and energise theory. Now scholars such as Foster and Burkett need to be materialist enough to learn from these activists when classical constructs no longer fit reality. After all, there is not much point in sustaining Marx while letting nature go to the (capitalist) dogs.

NOTES

1. Dialectics is relational thought, seeking to understand how entities continuously form and re-form by interaction with other entities. Unlike everyday common sense, ideology, or scientific positivism, dialectical reasoning focuses on process rather than substance, on non-identity rather than identity.

2. See also the discussion of Bertell Ollman’s approach in Salleh (1997), Ecofeminism as Politics, chapter 10.

3. Nor do Foster and Burkett mention the direct influence on Marx of Auguste Comte’s mentor Saint-Simon (Manuel, 1963).

4. A second sense in which different discourses are at play in Marx’s work is easier to grasp. It stems from the fact that his understanding evolved from its original basis in philosophy to more mature work informed by studies in political economy.

REFERENCES


Our article “The Dialectic of Organic/Inorganic Relations: Marx and the Hegelian Philosophy of Nature” (Foster & Burkett, 2000) appeared in Organization & Environment exactly 1 year ago. Our purpose in that article was a very specific one made very clear from the beginning. We were concerned with addressing one of the most persistent and seemingly penetrating criticisms of Marx for his supposed insensitivity to ecological issues, namely, the claim that in referring to nature as “the inorganic body of man” in his Economic and Philosophic Manuscripts of 1844, a work otherwise known for its ecological values, he had denied an organic relation between human beings and nature, thus sinning irredeemably against ecology and no less so against dialectics (Marx, 1974, p. 328).

In addressing this question, we naturally singled out some of those thinkers who had emphasized this common criticism in their treatments of Marx. The best known and single most important work along this line was noted social ecologist John Clark’s (1989) article in Environmental Ethics entitled “Marx’s Inorganic Body”: a widely cited work that focused centrally (as its title suggested) on the ecological significance of Marx’s use of the term inorganic. Clark had argued that the “embarrassing fact” about Marx’s treatment of the human relationship to nature was that Marx had described nature not as the “organic” but rather as the “inorganic” body of man (p. 244). For Clark, this reference by Marx to “the ‘inorganic’ quality of ‘external’ nature signifies its instrumental character in relation to an abstracted humanity, which is taken to be the source of all value” (p. 251). Moreover, not stopping with Clark, we examined the criticisms of other left thinkers who had voiced essentially the same criticism, including Capra (1982), Eckersley, (1992), Lee (1980), O’Neill (1994), Routley (1981), Salleh (1997), and Soper (1996). The first section of our article, following the introduction, was entitled “The Critique of ‘Marx’s Inorganic Body’” and looked at this fundamental criticism of Marx as voiced by all of these thinkers. The purpose of our article was to address this criticism systematically, through historical and textual research, to determine its validity. Was this criticism of Marx justified in light of the available evidence, or was it not?

In the second section of our article, entitled “The Organic/Inorganic Distinction and Hegel’s Philosophy of Nature,” we therefore examined how the term organic had been used in antiquity and the way the concept had been employed from the
17th through 19th centuries. In ancient Greece, the term *organic* (or *organon*) had a
dual meaning: It was seen as referring both to bodily organs and to instruments. The
Greeks, with their natural-born dialectics, saw human tools or instruments as exten-
sions of human organs, reflecting the more universal way in which human beings
are able to adapt to their environments. This complex, dialectical notion was later to
play an important role not only in Marx’s work but also in Darwin’s evolutionary
theory.

By the 17th century, *organic*, as Carolyn Merchant (1980) has pointed out, had
come “to refer to bodily organs, structures and organization of living beings”
(pp. xix-xx). *Inorganic*, conversely, came to mean “without organs” or not con-
nected to “bodily organs.” Marx’s dialectical reference to nature as the inorganic
body of man was meant, then, to convey that human beings and nature were con-
nected together, even bodily (i.e., in the most intimate way possible, because as
Marx, 1974, emphasized, “man is a part of nature” [p. 328]), but that human beings
related to nature as extensions of their bodies—through tool making—beyond their
own bodily organs (i.e., “inorganically” in this sense). By using the term *inorganic*,
Marx was therefore not attempting to divide human beings from nature—to deny
what we would today, more loosely, refer to as an “organic relationship”—but
merely seeking to define the character and limits of that relationship and the cen-
trality of *tool making* in human evolution as an “inorganic” extension of mere
bodily organs. This fundamental distinction, which since the days of Alfred Lotka
has been known as the distinction between *endosomatic* instruments and *exosomatic* instruments, is today considered to be one of the most important bases
for understanding how human evolution has produced a historical ecological crisis

We might have stopped our systematic inquiry into Marx’s use of *organic* and
*inorganic* there, but to do so would have left the matter incomplete because it would
have excluded the important role that Hegel played in influencing Marx’s under-
standing in this respect, and some of the more dialectical elements of Marx’s
conception. We thus analyzed in detail Hegel’s (1830/1975) dialectic of organic/
inorganic relations, as presented in *The Philosophy of Nature*, and the role that this
played in the formation of the perspective that Marx developed in his *Economic and
Philosophic Manuscripts* and later works. This was all the more important because
none of the critics who had focused on Marx’s use of the phrase *inorganic body of
man* had related his usage back to Hegel’s dialectical treatment of organic-
inorganic relations (although the influence of Hegel on Marx is well-known). Hegel
had argued that the living being develops and objectifies itself only “against an inor-
ganic nature,” which it “assimilates to itself.” Organic nature is subdued and
“suffers this fate, because it is virtually the same as what life is actually. Thus in
the other the living being coalesces with itself” (Hegel, 1830/1975, p. 281). For
Hegel, as for Marx after him, the distinction between organic and inorganic was no
absolute barrier, or relation of absolute dominance, but a dialectical relation of
interdependence.

After discussing in considerable detail the dialectics of organic/inorganic rela-
tions as they appeared in the work of both Hegel and Marx, our article went on to
look at how Marx’s perspective was modified and deepened through the growth of
materialist science in the mid-19th century, particularly under the influence of
thinkers like Liebig, Mayer, Hemholtz, Joule, and Darwin, within chemistry, phys-
ics, and evolutionary biology. In this context, we explained how Marx’s own dialec-
tic of organic/inorganic relations came to be transformed in his later works (given
the path-breaking scientific developments that these thinkers represented) into a theory of ecological contradiction that took into account the “metabolic rift” between human beings and nature and the need for “restoration” of sustainable ecological relations (on the metabolic rift see also Foster, 1999, 2000). Here, the influence of Liebig was particularly profound. It was in this later argument on the metabolic rift that Marx made his analysis of the alienation of nature—his crucial contribution to the dialectic of organic/inorganic relations—concrete, giving it a historical and scientific foundation.

We concluded the article by reflecting further on the standpoint of those critics who had all too quickly condemned Marx for employing the concept of the inorganic body of man but who had failed to look at the meaning of the phrase in his day or at the complex dialectic of organic/inorganic relations embedded in his thought. Why were these critics so quick to condemn Marx in this respect and so little able to understand the nature of his argument? We argued that this was traceable to certain predispositions of Green theory, such as a primarily ethical and spiritual orientation, a reliance on the dualistic notion of anthropocentrism versus ecocentrism (a new version of the old “man” vs. nature conception), and a teleological conception of nature. There were, we insisted, two general ways of approaching Marx and ecology on the left:

At issue in the standard critique of organic/inorganic distinctions then are two different and strongly opposed visions of ecological philosophy: one that is materialist, historical, and essentially scientific in character; the other that derives its emphasis from mystical distinctions between anthropocentric and ecocentric and from spiritualistic allusions to nature’s teleology. . . . “The conventional antinomies of nature/culture, environment/society, human/nonhuman, and subject/object,” Timothy Luke (1999) has written, “all implode in Marx’s rendition of these links as one active organic/inorganic project” (p. 44). In Marx’s materialist dialectic of organic/inorganic relations, one finds neither a narrowly instrumentalist, anthropocentric perspective nor a flight into mysticism, but rather the core of an ecological critique of capitalist society—a critique that should allow us to translate ecology into revolutionary praxis. (Foster & Burkett, 2000, p. 422).

Having gotten at last to the bottom, we thought, of Marx’s usage of the phrase the inorganic body of man—an issue that had bedeviled so many earlier thinkers—we welcomed the news that John Clark (2001) and Ariel Salleh (2001) were writing responses to our article. We felt certain that they would be drawn to the persuasiveness of our argument, given our genetic account of how these ideas had arisen, how they had been employed, and what it revealed about the ecological connections between thinkers as various as Hegel, Marx, Liebig, and Darwin. Although there would almost certainly be disagreements remaining, given quite different paradigmatic orientations, we thought that socialist ecology would be pushed forward decisively by any exchange that took as its basis the historical discoveries into the development of ecological ideas that we had made.

We were both astonished and disappointed, therefore, to discover that in replying at length to our article, neither Clark (2001) nor Salleh (2001), both of whom had contributed to the criticism of Marx’s inorganic body concept, and who had thus helped inspire our inquiries in this area, chose to respond to our central argument. It was as if our argument, together with all of the evidence that we had accumulated to back it up—thousands of words of testimony on one of Marx’s most fundamental ecological insights running throughout his works—was invisible.
Instead, the responses—more than 3,000 words by Salleh and more than 5,000 words by Clark—concentrated not on the central question of the interpretation of Marx’s treatment of organic/inorganic and its ecological-dialectical implications that had dominated our own analysis but on other issues related to the status of their own contributions to social/socialist ecology, largely divorced from the question of Marx’s analysis.

We had addressed Clark and Salleh, first and foremost, as interpreters of Marx, and moreover as interpreters of Marx with respect to one specific question. We had naturally, therefore, expected a response to this before all else. Were the ecological criticisms leveled at Marx with respect to his use of the concept of the inorganic body of man justified, or were they not, in light of the historical and textual analysis that we had provided?

CLARK’S “MARXES”

Clark’s (1989) essay “Marx’s Inorganic Body” had claimed again and again, in no uncertain terms, that Marx’s so-called Prometheanism was evident in his reference to nature as the inorganic body of human beings. His essay has been widely cited in that regard. We chose this as the central issue of our essay and directly disputed that claim, providing substantial historical and textual evidence. Yet, Clark (2001), in his response, never refers directly to our contravention of his claim at all. Indeed, the closest he comes to acknowledging our main argument, which contested his own earlier contentions, is to say that in criticizing his argument on Marx’s use of the inorganic (two short quotes from our article are given), we had failed to recognize another statement he had made, in which he quoted Wordsworth’s warning about minds that “murder to dissect.” Such a point, however, hardly advances the discussion, and we are left in the dark about Clark’s view of our central argument, which had contested his own.

To be sure, Clark (2001) now claims that his argument in his 1989 essay on Marx’s inorganic body was “rather limited and one-sided” (p. 432) and characterized by “ideological distortions, which [he says] cannot be analyzed adequately in this brief discussion” (p. 441). What he appears to mean by this, judging by the rest of his response to us, is that in his original essay, he had pointed to two different “Marxes,” whereas he now believes there were “(at least) [italics added] three” (p. 432). In his 1989 article, Clark had singled out a “Promethean Marx” (which we will call “Marx I”) and an “ecological, radically dialectical Marx” (which we will call “Marx III”). (Marx III, although present in his original article, Clark observes in his response to us, was “underemphasized in part on ideological grounds,” p. 433.) Now Clark is prepared to argue that standing all along between the extremes of Marxes I and III (but not evident in his own earlier analysis) there was also another Marx—a “managerial . . . systems-theoretical Marx” (p. 433), which we will call “Marx II.” Marx II was “merged” with (or, more accurately, subsumed under) Marx I in Clark’s (1989) original essay on Marx’s inorganic body. The confusions resulting from the subsumption of Marx II under Marx I and the failure to fully acknowledge Marx III in his 1989 article was a product, Clark (2001) says, of his “sectarian, Bookchinite, anarcho-communist politics” (p. 441), to which he adhered at the time he wrote “Marx’s Inorganic Body.” (Clark insists that he has renounced his earlier “Bookchinite” views and presently identifies with a certain current within the journal Capitalism, Nature, Socialism.) The problem with our work, then, Clark claims, is that it brings out the strengths of Marx II (without dis-
proving the existence of Marx I) but falls short of the perspective of Marx III, with which he now identifies.

All this strikes us, we must admit, as more than a little odd. We know only one Marx (and one Engels): the Marx who declared that there is really only “one science”—history, with two branches, natural and social (Foster, 2000, p. 226; Marx, 1967, p. 408). For those who seek to avoid any question of unitary (even if genetic) interpretation, it is no doubt convenient to simply say that there are one, two, or three—or perhaps four, five, or six—Marxes. But, that appears to be mere circumlocution. No doubt there was within Marx, as in all thinkers, a certain level of ambiguity and ambivalence. But, to isolate these Marxes one from the other as a set of abstractions divorced from the real thinker, real history, and real struggles is for us mere intellectual game playing, a sort of postmodernist exercise in discursive constructions ad infinitum, with every thinker given over in part to his or her own ghosts. From this standpoint, there is no such thing as a meaningful search for truth in interpretation; whatever one wants to say one can say about a thinker (and the opposite as well, along with as many variations as one likes in between).

Beyond all this, Clark (2001) finds space in his response to tell us that Marx did not get along with his mother as well as he did with his father (the ecological significance of which is not altogether clear to us). Yet, Clark does not find room to comment on the dispute that we had with his interpretation of Marx on the inorganic body of man. He interprets Marx’s (1857/1973) observation in the Grundrisse that the worker under capitalism becomes a “watchman and regulator of the production process” as hard evidence of Marx’s “Prometheanism” without acknowledging that Marx was (a) simply describing a real process, (b) providing a critique of capitalist alienation of work, and (c) building this on a conception of the capitalist alienation of nature. Clark insists on the need for teleological ethics, a teleological relation to nature, and a teleological interpretation of dialectics without once recognizing that this conflicts not only with his Marx I and Marx II but even with his Marx III. He criticizes us for being insufficiently dialectical and ecological without once acknowledging that we devoted thousands of words in our article to discussing the relation between Hegel and Marx with respect to the “dialectic of organic/inorganic relations.” In fact, our entire discussion of Hegel simply never comes up in Clark’s response.4

Our article, which was principally concerned with dialectically addressing the question of Marx’s inorganic body, to use the title of Clark’s (1989) original essay, is thus responded to with a series of extraordinary prevarications in which Marx is revealed as having numerous separate existences; or, as Clark (2001) otherwise puts it in the title of his reply, it is not a question of the dialectical conception of nature and society that Marx developed but rather of “Marx’s natures,” understood as plural (and hence separate) and discursive. For us, in contrast, Marx’s work has to be approached as a dialectical whole, not as a set of isolated fragments that can be arbitrarily separated out and opposed to one another. Regrettably, these differences in method between Clark and ourselves tend to shut down the discussion, leaving little hope that we can rationally resolve our differences, or even engage in meaningful debate.

SALLEH AND MATERIALISM

Ariel Salleh (2001) also largely ignores our efforts to explore criticisms of Marx for using the concept of nature as the inorganic body of humanity and our treatment
of the dialectic of organic/inorganic relations—the whole point of our article. Her approach to these issues is sharply distinguished, however, from Clark’s (2001). For example, she says at the outset that our article “provides [a] valuable exposition of Marx’s text on the humanity-nature relation” (p. 443). She also concedes that our argument that Marx’s use of the concept of nature as inorganic body should not be taken as “denigrating nature” is, as an argument, “fair enough.” This is an important acknowledgement on her part, because Salleh had previously employed that criticism of Marx. Yet, she has nothing more to say about our central argument. Her main focus is on our point that the criticisms of Marx’s organic/inorganic usage rely generally on arguments that are spiritualist and idealist, as opposed to materialist.

In the context of addressing the question of materialism, Salleh (2001), however, does address an important—but secondary—theme in our article. We had used, for variety, a layered definition of materialism presented by Maurice Mandelbaum (1971, p. 22). (A more sophisticated definition is to be found in Bhaskar, 1983, and is quoted extensively in Foster, 2000.) What Mandelbaum’s definition had indicated (and what Bhaskar’s definition makes even more explicit) is that materialism of the kind represented by Marx has at least three elements: ontological, epistemological, and practical. Ontologically, Marx took a realist position that nature exists prior to and independently of human consciousness of it. The debate over realism, in this sense, goes back to the roots of Western philosophy in antiquity. Realism can take various forms, including mechanistic materialism/positivism, emergentist materialism, and objective idealism.5

In responding to our argument, Salleh (2001) explicitly rejects what she calls “the first position” or a “realist ontology.” She argues that “in positing general processes such as thermodynamics or evolution and variable factors such as locality, [the first position] assumes that nature or society can be known directly using a positivist epistemology” (p. 444). Here we differ. Adherence to realism can mean that one has adopted a positivist outlook (e.g., Laplace, Comte, or Durkheim). But, it also can mean that one has adopted an objective idealist position (Plato, Aristotle, Hegel, and Peirce were all realists in this sense). Further, it is consistent with the rejection of mechanistic materialism or positivism (along with idealism) and the adoption of an emergentist/dialectical materialist approach (Epicurus, Feuerbach, Marx, Darwin, and Bhaskar can all be viewed in this way). Within philosophy, realism does not necessarily imply positivism, although positivists normally are realists (see Creaven, 2000; Niniluoto, 1999, pp. 21-41). But, the question of realism remains nonetheless important, and especially so for ecologists. We would argue that it is impossible to adopt a meaningful ecological perspective without a realist outlook that suggests that “the world exists independently of [and prior to] human knowing” (p. 444). Materialism, to be worthy of the name (i.e., to be ecological), must extend down this deeply, acknowledging the independent existence of an evolving material world, of nature. Nevertheless, Salleh herself adamantly rejects this “first position.”

Rather oddly, Salleh (2001) justifies this rejection on the basis of her adherence to Bhaskar’s critical realism. But here, she is mistaken. Bhaskar’s work is critical realist in that it takes into account the epistemological question as raised most notably in Kant’s three critiques (i.e., it does not represent a naive abandonment of epistemology—its reduction to mere mechanical reflection—as in positivism). But, Bhaskar’s approach remains critical realist. In the tradition of critical materialisms and realism in general, it rejects what Bhaskar (1979, p. 171) termed the “epistemic fallacy” that all philosophy can be reduced to epistemology (ways of knowing), and ontology can thus be rejected. To adopt such an approach would be
to give in to skepticism of various kinds, Pyrrhonism, Cartesianism, Kantianism, neo-Kantianism, hermeneutics, postmodernism, and so forth. It would also go against one of Bhaskar’s primary projects: “the possibility of naturalism,” where the split between a positivist science (which rejects epistemology) and a hermeneutic social science (which rejects ontology and embraces subjective idealism/acosmism) can be surmounted.

Although opposing what she calls “the first position,” namely, a realist ontology that says that the world exists independently of our knowledge of it, Salleh (2001) introduces a “fourth position.” This is the view that “the world does not exist independently of human knowing,” which she says “implies an idealist ontology” (p. 444). According to this view, “social life” (and not only social life but also the world as a whole) is “entirely constituted by discursive practices” (p. 444). For this position, Salleh indicates some support, calling it “soft constructionism or ‘critical realism’” (p. 444), though it is obviously not critical realism at all and is much closer to a hard constructionism.

Salleh (2001) says that she “expects” that we would “agree” with her that the first position (i.e., realism) “is not relevant to our discussion” (p. 444). But on that, we absolutely do not agree, because we consider realism essential to ecology and to (nonpositivistic) science. At the same time, Salleh says that we would “probably agree in rejecting the idealist ontology of the fourth position but disagree on the usefulness of applying its deconstructive technique” (p. 444). She is right that we would strongly reject the acosmism (subjective idealism) embraced by the fourth position. But, we would also argue that this type of idealist outlook is not easily separated from the methodology used within radical constructionist-discursive practices. This is a problem of postmodernism in general.

Like Salleh (2001), we would be willing to embrace a “cautious constructionism” (see the statement on this in Foster, 2000, p. 17), and like Marx and all other philosophers of significance, we would leave room for “critical” knowledge in which the mind plays an active role in our understanding of reality. But, Salleh’s approach to constructionism (hermeneutics) appears to us to be anything but cautious or realist (critical or otherwise). Although no objective idealist, and indeed a materialist within a limited, practical domain, Salleh seems very much attracted (unabashedly so) to radical constructionism/subjective idealism (i.e., acosmism). But such outlooks, we would argue, reproduce much of the inability to understand the dialectical relation between human beings and nature by privileging once again an abstracted human mind/spirit.

A similar difficulty arises for us from Salleh’s (2001) usage of the concept of “the Great Chain of Being” (or Scale of Nature). This concept, which is central to the history and philosophy of science, dates back to antiquity within Aristotle’s philosophy and became a central aspect of the medieval Christian theological view. It also governed much of science up through the 17th century. It was subsequently discarded as evolutionary perspectives came to predominate within astronomy, geology, biology, and so forth. (For the classic treatment, see Lovejoy, 1964.) As explained in Marx’s Ecology:

The traditional [teleological] concept was that of the “Scale of Nature” or “Chain of Being,” which assumed not only that there was a fine scale or gradation of nature, leading up to human beings, but also the immutability of species—all of whom had originally been created separately by God. This scale was essentially static. A common assumption was that human beings, although not much lower than the lowest angels, were actually in the middle of the scale, and that the higher
Consistent materialist and evolutionary thinkers such as Marx and Darwin were at war continuously against the Scale of Nature and other teleological conceptions of nature. Idealists such as Hegel almost invariably supported them and rejected transmutation of species. We objected, therefore, to Salleh’s (1997) claim that Marx’s analysis is “riddled with ontological assumptions derived from the Great Chain of Being” associated with such notions as “God’s domination over man, and men’s dominion over women, the darker races, children, animals and wilderness” (Salleh, 1997, p. 71). This seems to us to be a misnomer. Marx’s analysis, we would argue, is in fact remarkably free from such “ontological assumptions.” Domination for him was not due to some Christian-medieval theological conception, idealist ontology (involving teleological notions), essentialist criteria with regard to human nature, and so forth—in fact, Marx, as a consistent materialist, is notable as a lifelong fighter against all such notions. Indeed, any attribution of the concept of the Great Chain of Being to his thought seems extraordinarily misleading.

To be sure, Salleh (2001) in her response to us says that she is not using the phrase as it has long been used in the great conflicts between religion and science, materialism and idealism. Rather, she is using it in the much more general way that has emerged recently in ecofeminist thought to mean an active element—perhaps even the active element—of Western culture in Marx’s day and in our own; an “ideology inherited from the Judeo-Christian heritage.” Recognizing the existence of the Great Chain of Being as a cultural norm and Marx’s part in it simply by virtue of the fact that he was a man living in his time helps us, she says, move beyond “Marx’s partiality.” This type of criticism strikes us as peculiar. It is used as a kind of holistic, portmanteau criticism applicable to each and every thinker (or at least all 19th-century, White, male, European thinkers) without any distinction simply because they belonged to the culture of their time. What they did in rejecting the notions associated with the Great Chain of Being seems to be immaterial. They were products of their time, which was culturally defined above all by this amorphous concept. This is hard to object to because it is difficult to pin down. At the same time, it is hard to see the point, or why such an amorphous criticism should be laid at the door of any particular thinker, especially one so sharply critical of all such teleological-idealist-essentialist conceptions as Marx.

Salleh’s (2001) most specific criticism of Marx is that he emphasized a conception of value that privileged men over women, productive labor over reproductive labor, and that his whole value theory was instrumentalist in character, denying the contribution of nature. These are broad misunderstandings. Marx argued that the law of value was specific to capitalism, and in describing how value worked (and what defined productivity under this system), he was describing capitalism. It was not Marx who deemed domestic labor “unproductive” but capitalism, which put no value on it (and never can, at least without distorting and undermining its use value—see Burkett, 1999b; Waring, 1988). Marx himself was a critic of capitalism and saw this for what it was: the denial of wealth-generating activity outside the realm of the market and commodity production. His argument in this respect is clearest in relation to nature, where he said that nature along with labor is one of the two sources of wealth (Burkett, 1999a, p. 26; Marx, 1867/1976, p. 134). But, capitalism does not see nature as contributing directly to total value, as this is measured under capitalism, but rather treats nature’s contribution as a free good to the property owner.
Marx, who wanted the entire wage relation dissolved, was hardly one to privilege wage labor over nonwage labor, nor did he see wage labor as “men’s labor.” This was not the reality in his time, and his analysis is directed again and again at the exploitation of women as well as men and at specific, egregious forms of the exploitation of women. This is not to say that Marx’s analysis was entirely adequate in this respect, only that he did not privilege productive labor over nonproductive labor (as these were defined under capitalism), men’s labor over women’s labor, labor’s contribution to wealth over nature’s contribution.

But, did Marx not approach nature primarily “instrumentally,” as Salleh says? That depends on what one means by “instrumental.” Labor for Marx was another term for the metabolic transformation of the human relation to nature, using instruments derived from nature. In that sense, he was “instrumentalist,” as we all are. But, Marx insisted on the need for a sustainable human relation to nature and provided a critique of the alienation of nature. In that sense, he adopted a position that was a far cry from what would normally be called an instrumentalist view of nature. How one views these things, though, depends on how one stands. For deep ecologists, human beings are inherently instrumentalist, though we can strive, they also say, to be suprahuman—to “think like a mountain” and perhaps live like a mountain. With respect to such purely sentimentalist conceptions of nature, which denied the human laboring condition, Marx was a ruthless critic.

Are there things left out of Marx’s materialist approach to nature that need to be developed to create a more adequate ecological materialism? Yes, of course, and they are many. Ariel Salleh’s own work, we would argue, has helped fill some of these gaps and represents in its broadest contours an important contribution. Salleh (2001) complains that in our article on Marx’s dialectic of organic/inorganic relations, we ignored the most important aspects of her work, simply emphasizing her interpretation of Marx. But, the interpretation of Marx was what our article was about. Elsewhere, we have separately highlighted the path-breaking nature of Salleh’s work. One of us (Burkett) has written a (forthcoming) review of Ecofeminism as Politics (Salleh, 1997) for a major publication, affirming the extraordinary importance of her work. The other (Foster, 2000, p. 254) has pointed to the critical importance of the concept of “embodied nature” as developed by Salleh and others. Disagreements remain. But, none of this erases the fact that in our view, a developed dialectic of organic/inorganic relations is essential, even though it would ultimately have to include the new ecological materialist emphasis on the body that Salleh has so importantly advanced.

NOTES

1. Although we did not discuss the use of these concepts that Georgescu-Roegen (1971, 1976) took from Lotka in our original article, the theoretical distinction between endosomatic and exosomatic instruments is exactly the same one as made by the ancient Greeks and employed in the 19th century by thinkers such as Marx and Darwin, using the terminology of organic and inorganic and of natural technology and human technology. Moreover, it constitutes an essential element in the contemporary ecological critique of capitalist society.

2. Clark (2001, p. 433) says that we “do little if anything to exorcise the Promethean Marx” in our article. This is because such a critique goes beyond the boundaries of what we were addressing in that article and because we have both provided extensive critiques of this interpretation (including Clark’s views) in our previous work (see especially Burkett, 1999a, pp. 147-173; Foster, 1999; Foster, 2000, pp. 126-140).
3. In our article, we made the error (for which we adamantly apologize) of saying that Clark in his 1989 article showed no firsthand knowledge of Marx’s *Capital* and took his citations from the excerpts provided by Howard Parsons (1977) in his useful *Marx and Engels on Ecology*. This was a mistake on our part and was ungenerous to boot. The error will be corrected if our article is ever reprinted. Clark did demonstrate in his original article firsthand knowledge of Marx’s *Capital, Vol. 1* (Marx, 1867/1976) and also some knowledge of *Capital, Vol. 3* (Marx, 1894/1981). However, there is no sign in his work of a detailed assessment of Marx’s ecological writings such as might have been undertaken prior to writing his critique. For example, there is virtually no reference to the hundreds of pages that Marx devoted in *Capital, Vol. 3* (Marx, 1894/1981, pp. 751-950) to agriculture, including its ecological contradictions. Clark (2001) himself has admirably acknowledged the shortcomings in his earlier reading of Marx in this respect. Hence, he quite generously thanks Paul Burkett for his exhaustive documentation [in Burkett, 1999a] of passages in which Marx discusses topics such as soil conservation and pollution. I am grateful to him for his careful scholarship and for correcting a shortcoming in my analysis and in that of many others. (p. 434)

We consider this to be an important and very gracious admission, clearing the way for the kind of close examination of Marx’s work in this respect, and its relation to other ecological contributions of his time (and subsequently), that we think is very much needed.

4. Besides ignoring our discussion of dialectic (while criticizing us for being insufficiently dialectical), Clark (2001) also neglects to discuss our treatment of materialism, even in the section of his response entitled “The Historical Struggle Between Materialism and Teleology.”

5. In referring here and in subsequent passages to “emergentism,” we are referring to what became the central concept in the resurrection of both realist philosophy and nonreductive philosophical materialism in the late 20th century. This idea, which has become a central notion of scientific as well as philosophical realism, focuses on the evolutionary development of “integrative levels” within nature (and society)—levels that have arisen from, but are nevertheless irreducible to, those that preceded them. The significance of this analysis lies in its rejection of both mechanical materialism, with its reductionist hypotheses, and the teleological views characteristic of idealism. The most influential modern exponent of emergentism within the realist philosophical tradition in the early to mid-20th century was C. Lloyd Morgan (1926), but this form of analysis has also been advanced by Marxists and critical realists such as Joseph Needham (1938) and Roy Bhaskar (1993). For a general history of the concept, see David Blitz (1992).

6. Salleh’s (2001) skepticism and ambivalence on the question of ontology can be seen in the fact that she explicitly rejects both “the first position,” that is, realism (the notion that the world exists independently of our knowledge of it) and “the fourth position,” which she calls an “idealist ontology” (the notion that the world does not exist independently of our knowledge of it).

7. *Acosmism* in philosophy refers to the position that denies the independent existence of a material world or cosmos. It is especially characteristic of subjective idealists such as Berkeley.


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As the film begins, we see tigers moving through the forest in slow motion. “The Bengal tiger is being driven to extinction,” says the voice-over. “It’s clear that radical conservation measures are needed, if it is to survive outside zoos.” These stark words begin Suits and Savages, a short documentary treating wildlife conservation in India and the World Bank’s role in such efforts. Based on work by researchers at Hull University, it dramatizes important questions related to development and conservation. In the end, though, it fails to tackle the most pressing issue identified—What radical conservation measures are needed?—due to an exclusive focus on conflicting human interests, and too little emphasis on visualizations of concerns about the destruction of habitat and wildlife.

The film is divided into three parts. In the first, the filmmakers visit Nagarhole National Park in southern India, a “Project Tiger” site devoted to biodiversity conservation. Fifty-eight indigenous villages are found inside the park, their inhabitants hunting, gathering, and farming. Park managers and Project Tiger officials want to move these people out of the park to minimize human-tiger conflicts and prevent habitat degradation. The indigenous people resist, asserting their respect for the forest animals and the harmlessness of their activities. Park officials are the real danger, they say, selling timber illegally and promoting luxury tourist facilities. One astute old woman says, “They want us out, so no one can see what they are doing.”

Into this situation steps the World Bank, or rather its Global Environmental Fund (GEF), a multibillion dollar initiative to promote “green” projects around the world. The GEF pumps several million dollars into Nagarhole Park and plans to spend $67 million on Project Tiger sites around India. The money goes partly to equip park rangers and beef up antipoaching patrols, partly to reimburse and resettle people living within the parks. As P. K. Sen, Project Tiger’s director, puts it, “The basic idea of the project is to keep animals inside the park and people outside the park.” Resettlement, however, is supposed to be voluntary, with inducements such as sewing machines and legal title to land outside the parks to induce people to leave them.

The money flows in, and predictably, there is conflict. Indigenous leaders complain that little or none of it gets to them. Worse, they are being pressured to leave the park. Interviews show a park service employee making disparaging comments about the drunken, impecunious locals. Shots of sterile, cinderblock huts suggest the dreariness of resettlement.

The second part of the film shifts to New Delhi, where GEF officials from around the world have gathered to review projects and hear feedback from affected localities (the GEF has a strong mandate to solicit local input into its projects). Indigenous leaders from Nagarhole come to the meeting but are clearly out of their element in the fancy meeting rooms. Other speakers assail the project, however, which GEF officials vigorously defend.

The third part of the film follows a conference attendee back to his offices in Washington, D.C. He discusses the goals of the GEF, particularly the hope that suc-
cessful GEF projects will push the World Bank as a whole in a more green direction. The highlight of this final section is the presentation of a video from the Nagarhole villagers, stating their grievances. “What response should they bring back?” the makers of the film ask. “Tell them we’ve heard their concerns,” he replies.

The film leaves little doubt that the indigenous people are getting a raw deal. Local consultation does not mean local control; their access to land is being restricted; precious few of the GEF dollars are flowing to them; and in any case, these incentives and benefits are poor recompense for losing a way of life. The movement of the film dramatizes their marginalization and impotence as we move from Nagarhole to Delhi to Washington.

This movement, however, also takes us farther away from the tigers. At least the filmmakers play the villagers’ tape in Washington; there is no similar tape from the animals or from anyone speaking on their behalf. In fact, the last we see of any tigers is in that opening scene. They vanish from the film as thoroughly as they are vanishing from the Indian landscape.

This points to the main failure of this film. The filmmakers show human conflicts with some dramatic flair and cleverness but lose sight of the nonhuman beings whose very existence is at stake. Because the primary purpose of Nagarhole National Park, Project Tiger, and this GEF initiative is to protect biodiversity, some discussion of their success or failure in doing so would seem necessary. We do not get this because the filmmakers share the World Bank’s traditional view that people and their concerns are all important. They differ on which people they care about and what they think is best for them—that’s all.

The film implies that local people should be allowed to stay in Nagerhole, live as they have in the past, and help manage the park. But, it fails to discuss the impact of thousands of people’s subsistence activities on park biodiversity. It fails to consider the effects of double that number of people in the next generation (as elsewhere in India, the villages swarm with children). It fails to consider whether the “savages” will remain savages; in fact, indigenous lifestyles are changing and disappearing rapidly in modern India.

I can imagine a different film, one that skips the trips to New Delhi and Washington (I don’t like big meetings either). In this improved version, the first part of the film would look at the conflict between the park service and the local people, but this would be followed by a serious investigation of conditions in the park. Rather than just repeating accusations of park service mismanagement, it would try to nail down evidence of the illegal logging and consider the likely effects of proposed tourist developments. It would set aside noble savage stereotypes and document the actual effects of the indigenous people on the landscape. All this would presumably bring in conservation biologists, noticeably absent from the actual film. Part three, then, would consider the best ways to protect the park. This would surely mean eliminating logging and luxury hotel development. But, it would also likely mean moving the local people out to the park’s periphery and enforcing strict rules on what they could do within it.

India’s population has tripled in the past 50 years. In the process, much of the wildlife habitat existing at Independence has been lost to agricultural development. If the tiger and some remnant of India’s unique natural heritage are to survive into the next century, Indians will have to set aside wildlife habitat and protect it. The
makers of *Suits and Savages* are not concerned about this, but many Indians are. This remains the last, best hope for the tigers.

—*Philip Cafaro*
Colorado State University,
Fort Collins
“ONE GOOD WORD IS BREAD FOR A THOUSAND . . .”

ELISABETH K. RYLAND
California State University, San Bernardino


A gifted trio of environmental thinkers and practitioners has joined forces to create this book. Paul Hawken (1993) is the author of The Ecology of Commerce: A Declaration of Sustainability, and coauthors Amory and Hunter Lovins are founders and co-CEOs of the Rocky Mountain Institute, a nonprofit resource policy center near Aspen, Colorado. Together, the Lovinses have published widely, consulted to industries and governments, and shared many prestigious awards. Amory Lovins is the youngest person ever to be named an Oxford don.

The premise of Natural Capitalism is that the economic theory behind the industrial revolution is outdated. In the year 1800, there were about 800 million people in a world with vast unexplored and unexploited continents, which is why the thinkers of the time proposed an economic system that valued maximum productivity of the limiting factor (labor) with little or no regard for resource efficiency. This business model is now creating massive problems in a world of more than 6 billion people and with looming resource scarcity.

An example of the current massively inefficient economy is told in the life story of the aluminum used in the production of a can of English cola. The aluminum travels on an intermittent journey of 319 days from bauxite mines in Australia to Scandinavia, then to Germany, and finally to England, where the final product is purchased. Drinking the cola takes a few minutes. Discarding the can takes a few seconds, and 90% of the aluminum used is scrapped. A similar story could be told about the life cycle of many other products, which generate massive amounts of waste and very little human benefit.

Natural Capitalism does not discard the premises of market capitalism but proposes a reevaluation of what constitutes the basic units of economic value. A business run by the principles of natural capitalism will (a) practice radical resource productivity, (b) use design taken from nature, (c) move to a service and flow economy, and (d) reinvest in natural capital. The book provides a wealth of examples of the successful implementation of all four principles, both in the United States and abroad.

1. The first principle is radical resource productivity. Currently, only 1% of the total North American materials flow is still being used as a product 6 months after the sale. Some very simple changes to the way businesses are run can solve many environmental problems and yield startling benefits for today’s shareholders and for future generations. By substituting intelligent design for the use of raw materials, many businesses have already achieved radical resource productivity and...
massive energy savings without loss of effectiveness. In a sense, the emphasis shifts from materials to intelligence.

The authors blast the standard economic idea of diminishing marginal returns to investment. Saving a large fraction of resources can actually cost less than saving a small fraction of resources: This is the concept of expanding returns to superior design. Also, seemingly minor conservation measures may be worth implementing in situations in which so much is wasted along the path of the process that 1 unit saved at the end of the pipe equals 10 units saved at the point of production. The synergies possible with whole system thinking are enormous, and the book provides clear examples of businesses gaining a tremendous competitive advantage by realizing 80% or 90% (Factor 5 and Factor 10) savings in materials with no loss of productivity.

2. Another principle of natural capitalism is design taken from nature (biomimicry). This involves a shift to biologically inspired production systems in which nothing is wasted and in which each output becomes a useful input in continuous closed cycles of materials. Spiders, for instance, make strong, tough silk from digested flies and crickets—without boiling sulphuric acid. Humans are the only species capable of creating toxic wastes that nobody else wants, and nature has 3.5 billion years of design experience to learn from.

3. The next principle is a service and flow economy. Customers do not necessarily want the equipment; they may just want what the equipment does. The service part means that a business takes its value from customers and provides services rather than equipment—selling the less tangible but equally important values of performance, problem solving, and satisfaction instead of motors, fans, plastics, and equipment. Again, the less tangible but crucial psychological benefits are emphasized above materials. In a service economy, customers and providers have the same goal: increased resource productivity and customer value. Planned obsolescence and disposables only make sense when providers make money from each sale. A service economy has the added advantage of dampening business cycles, because the demand for service, problem solving, and satisfaction is often more stable than the demand for products.

The flow part of this principle draws on the idea of lean thinking described by Womack and Jones (1996), and it aims at eliminating every form of waste, which is defined as measurable inputs or outputs that do not produce customer satisfaction. A lean system takes advantage of customer pull to make only what is needed, where it is needed, and when it is needed, thus saving cost and making the business more competitive.

4. The final principle, reinvesting in natural capital, goes beyond what an individual entrepreneur has the power to do. This section of the book details the many current disincentives for restoring the environment at the ideological, political, governmental, and corporate level, such as the fact that in nearly every country on the planet, tax laws penalize jobs and income while subsidizing resource depletion and pollution. To reinvest in natural capital, it is necessary to tax what society does not want, including pollution, energy from nonrenewable sources, pesticides, and waste sent to the landfill. Most of this is presented in chapter 13, “Making Markets Work.” This topic is actually so weighty that the reader who wants more detail should go to Korten’s (1995) outstanding book When Corporations Rule the World.

People and communities are an integral part of natural resources. The main focus of chapter 14, “Human Capitalism,” is that a healthy, well-functioning individual is a resource in itself, as is a healthy, well-functioning society. Because humans are a part of the environment, communities and people must be used
restoratively and not as throwaway commodities. Customers must be respected, and employees cannot be used extractably (as in sweatshops).

The four principles of *Natural Capitalism* are presented as transideological, with a focus on systems optimization and the common benefits for corporations, consumers, society, and the environment. Wildly unpredictable business cycles, worker cynicism, environmental degradation, and society’s general lack of hope for the future are all unavoidable outcomes of an outdated and dysfunctional business model. Good planning and good design are synergistic and create multiple solutions and unexpected side benefits. In the words of one natural capitalist, “You know you are on the right track when your solution for one problem accidentally solves several others.”

I recently participated in a 5-day seminar at Schumacher College at which Amory Lovins presented the ideas from the book. Schumacher College is a center for ecological studies that aims at promoting the values of E. F. Schumacher, author of the 1973 classic *Small is Beautiful: Economics as if People Mattered*. The college is situated in beautiful surroundings in Devon, England, in a region that is also home to thriving organic farming communities. Parts of the college buildings, most notably the library, date back to the 14th century. The seminar was attended by consultants and oil executives from the United Kingdom, the European Union, and the United States, who listened attentively and respectfully to Amory’s message.

At the time, I was already familiar with the agenda, but the seminar was worth attending for the subtext that it provided. In person, Amory Lovins embodies the message of the book: He comes across as a good-humored, multitalented, and incredibly resourceful person with a fund of experience, insight, and creative ideas. What I found most encouraging about attending the seminar was Amory’s enormous optimism about the future. He’s completely convinced that late 20th century horrors such as genetically modified (GM) foods will eventually go away because they violate several principles of natural capitalism. They violate Principle 2, because they do not take their design from nature. They also violate Principle 3 because, especially in this country, they have been sold while keeping customers in the dark about what they really are. People typically react negatively when they learn more about these products. Amory accuses Bob Shapiro of Monsanto (a big player in GM foods and a company that Amory has been a consultant to) of not having biological intuitions and not knowing his evolutionary biology. According to Amory, Monsanto is also mistaking its customers—the customers for GM foods are not farmers but people who eat!

*Natural Capitalism* addresses some issues that I have been working on recently. Last year, I wrote an article for *Organization & Environment* in which I explored some psychological reasons for the ongoing environmental problems (Ryland, 2000). The point of the article is that the real environmental problem of this age is a result of human psychological dysfunction. What is out there in the environment and so forth is in a sense a landscape of the human mind, because “nature” has by now been entirely modified by the human agenda. Current environmental disasters are a function of the ignorance, greed, denial, frustration, fear, cynicism, and most of all the apathy that paralyze the public and keep individuals from taking an active role in creating change for the better.

*Natural Capitalism* takes a similar view of the issue. It focuses on environmental problems in terms of the current suboptimal use of the human mind. The four natural capital principles require that business processes substitute intelligent design for materials flow, that they focus more on providing intangible psychological values
to customers in preference to ownership of specific goods, and that society employ better mental models and incentive systems to promote social and natural health.

In my article, I explored the idea of inner psychological healing as a solution to the problems “out there”: the coming together of the splintered parts of the psyche’s conscious and unconscious materials for a psychological integration. This allows a person to function in a healthy and forward-looking manner. *Natural Capitalism* has a similar focus: It aims at uniting the splintered parts of society by presenting realistic win-win scenarios that address the concerns of various groups of free marketers, social progressives, and environmentalists alike, enabling humanity to move forward instead of being stuck in social and environmental conflict.

There is a second psychological problem: Much well-meaning environmental literature exacerbates public defeatism by adopting an “ain’t-it-awful” attitude when trying to alert the public to the environmental debacle. So far, that approach has failed to generate the necessary corrective action. Psychological and social health requires a certain amount of focused hope for the future. Amory Lovins and his coauthors address this issue by their determined applied optimism. They prefer to use problem statements as springboards for solutions while demonstrating that it is necessary, possible, and practical to tip economic and social outcomes in a positive direction. Amory sees this in terms of aikido politics—you don’t fight the opponent, you dance with him.

The title of this review is taken from the poem “Loaves and Fishes” by David Whyte, which serves as the motto for the book. The poem is worth quoting in its entirety:

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This is not
the age of information.
This is not
the age of information.
Forget the news,
and the radio,
and the blurred screen.
This is the time
of loaves
and fishes.
People are hungry,
and one good word is bread
for a thousand.
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(Whyte, 1997)

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Throughout history, utopias have enjoyed great popularity. More’s *Utopia*, Bacon’s *New Atlantis*, Bellamy’s *Looking Backward*, Morris’s *News from Nowhere*, and many other books on utopias have been printed and sold in large numbers: Utopias have long been a treasured literary genre. Current philosophical journals such as *Alternative Futures* and *Utopian Studies* devote considerable attention to utopias, and all over the world, conferences and exhibitions are being organized. Utopias can be found appealing because they allow the reader to fantasize about an ideal world. Utopians do not take the existing order for granted but break consistently with the past and dare to make a promising fresh start. A special power of utopias is their ability to present political and social ideas in an unusually imaginative way, planting unorthodox images and impressions in the mind of the reader. Besides, utopias can function as a source of ideals and offer inspiration for both social action and taking control of one’s life.

Nowadays, utopia occupies a rather uncertain status. We live in a period that is characterized by liberalism, postmodernism, and a lack of faith in all-encompassing ideologies and idealist political visions. The communist regimes have collapsed, and the victory of liberalism hardly favors the utopian imagination. Nevertheless, utopia has not died in the modern era. There still seems a need for images of an alternative society, and many people are still fascinated by utopianism.

A proof of this is *Utopia: The Search for the Ideal Society in the Western World*. This voluminous book gives an impressive overview of the utopian tradition. It was published as a catalog on the occasion of the highly successful utopia exhibition in Paris and New York organized by the New York Public Library and the Bibliothèque Nationale de France in 2000. The central aim of the texts is to speculate on the role of the imagination, and even of fiction, in the construction of the future, to consider the pleasures and uses of the utopian model, and to explain its history, all the while drawing lessons from the century just ended. (p. xiii)

The book contains 22 articles on the various themes and issues related to the utopian genre written by experts in the field. The first part of the book investigates the historical sources of utopia. Attention is paid to the Greek, biblical, and medieval traditions. The second part analyzes the spread of the utopian imagination from Thomas More, who invented the word *utopia*, to the Enlightenment. The third part addresses communal movements, architecture, utopia, and antiutopia in the 20th century. The last part focuses on envisioning utopia: the illustrations and representations corresponding to utopian visions.

The articles are richly illustrated with prints, drawings, maps, books, and manuscripts, which were also displayed at the exhibitions in Paris and New York. The end result is an extremely elegant book that reveals many of the secrets, paradoxes, and complexities of the story of utopia. The completeness of the text is further
enhanced by an extensive bibliography of utopian literature, a vast and very useful bibliography of secondary sources, and a list of utopian and dystopian feature films.

The articles are well written and of high standard, but I found four of them particularly valuable. One of the most comprehensive and interesting essays is the profound historical analysis by Danielle Lecoq and Roland Schaer of the ancient, biblical, and medieval traditions. Lecoq and Schaer make convincingly clear that the literary genre long predates Thomas More’s *Utopia*, and their exploration of the Greek Golden Age and early Christian sources (the Garden of Eden) provides new and unexpected insights into the origins of utopias.

Another intriguing article is “The City as an Intellectual Exercise,” by Ruth Eaton. She argues that parallel to the utopian literary genre, there is the ideal city tradition, in which new urban models are designed. Artists such as Albrecht Dürer and Francesco di Giorgio Martini considered many aspects of ideal architecture and city planning in drawings, images, and models, hoping to construct an alternative environment and attractive towns. Equally convincing is the article by J. C. Davis and Gregory Claeys on socialism and utopia. They explore Owenism, Fourierism, Saint-Simonism, and Marxism, showing the massive appeal of egalitarian utopian systems to citizens and politicians. According to Davis and Claeys, socialism can be said to be utopian because of its fundamental beliefs that human nature can be improved, and production can be planned rationally. From a political theory perspective, however, the most important contribution is Krishan Kumar’s “Utopia and Anti-Utopia in the Twentieth Century.” Kumar argues that the fall of the Soviet Union and the dissolution of the communist regimes have had serious consequences for the significance of utopian thinking. Also, the present literary climate—today’s novels are directed to private worlds, not to society and politics—has led to a decline of utopia. Apart from that, Fukuyama’s claim of the end of ideology makes utopian ideas appear more and more illusory. Despite these trends, however, Kumar underlines the vitality of utopias:

> Utopia can probably take care of itself, in the long run at least. It is unlikely that so long as the human race continues, the “principle of hope” will ever entirely disappear. Utopia will be reborn, even if in forms that we cannot anticipate. (p. 266)

All in all, the book provides an elucidating analysis of utopian thinking in general, but it is also open to criticism on several counts. The first weakness concerns the fact that some articles show considerable overlap. The editors were not able to prevent a repetition of arguments on, for example, Plato’s *Republic* and More’s *Utopia*: Several summaries of and passages on these works seem redundant.

A second weakness is related to the definition of utopia that is used throughout the book. On page 15, utopia is set out as “a nonexistent society described in considerable detail and normally located in time and space.” Instead of restricting the utopia concept to more specific designs for an ideal social and political order, the editors opted for an extremely wide and, to my opinion, debatable definition of utopia. The advantage of this wide definition is of course that the many variations of the genre are included in one volume. The disadvantage is that satires such as Defoe’s *Robinson Crusoe* and Swift’s *Gulliver’s Travels* are also now analyzed as utopias, as well as the contributions of architects such as Frank Lloyd Wright. However, to many critics, not all fiction and imagery projection can be called utopian, as is suggested by the editors: Traditionally, the word *utopia* essentially concerns political visions.
A third defect is that the articles are not really interrelated and seem to stand too much on their own. There is no discussion between the authors, even though it is fully evident that there are significant differences in assumptions, general points of view, political aspirations, and ideals. This lack of internal debate in the volume makes it more difficult for the reader to take a position in the current discussion on the value of the utopian genre. An opportunity to make the text more critical and reflexive has been missed here. Similarly, a fourth deficiency is the inattention of most authors to the critical dimension of utopias. Utopias do not only describe an ideal social and political order; they also represent a most pertinent form of social critique. Utopian writers actually always hold up mirrors to their contemporaries. They formulate criticism of existing political and social systems, focus on certain of society’s negative aspects, and reflect happy worlds in the imagined past or the distant future. Utopians attempt to make their contemporaries conscious of the injustices and shortcomings to which they have long been accustomed. Anyone who studies utopias from previous centuries can also gain insight into social issues, newly formed moral questions, or dilemmas and political discussions of those historic periods.

In conclusion, it must be said that despite these weaknesses, this book gives an excellent survey of utopianism, old and new. This book is essential reading for students and scholars specializing in utopian studies and can be recommended to a wide audience. It provides a fascinating introduction to utopian thinking and is indeed beautifully illustrated with rare drawings, manuscripts, and other items that will stimulate the reader’s imagination. This is undoubtedly a great achievement by the editors, who have produced a book that is both valuable and accessible to the generalist and the specialist.

—Marius de Geus
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When is a book not a book? When it is a cyborg. Chris Hables Gray’s second venture into the world of the cyborgs, following on from the cult classic *The Cyborg Handbook*, expands cyborgisation into literature by publishing the main narrative text in book form and placing pages of extra information, notes, and comments on Routledge’s specifically designed Web site at http://www.routledge-ny.com/CyborgCitizen. If you don’t have access to the Internet 24 hours a day, don’t be put off by this, because the book can read on its own.

The idea of turning organic life into part machine for enhancement or simply to allow continued life, as with polio victims, is not new, but what is new is the rate and speed of technological change and the unforeseen impacts this change has had. *Cyborg Citizen* is a text written to highlight the present and future of the cyborgisation of everyday life; not the science that can be accessed though a number of hyperlinks at the Web site, but the politics, beliefs, hopes, and a number of fears.

The word *cyborg* itself has a number of images attached to it. For example, for sci-fi fans, it is often thought of as “the Borg” from *Star Trek: The Next Generation*: half men, half machines trying to weed out imperfection and create cyborg perfec-
tion. Or, a lot closer to home and reality, it could be Christopher Reeve adapting to and publicising life aided and given by machines since the accident that damaged his spinal cord. Gray, however, adopts a much broader working definition that encompasses nearly everybody, from the likes of Christopher Reeve to babies who have been vaccinated: anyone in fact who in some physical way has been technology-altered. Because the vast majority of us to some extent must therefore have been “cyborged,” we are living, it follows, in the posthuman age. Once there is the understanding that we are the cyborgs under discussion, that they are not out there but in here, then the book becomes more personal and the issues more relevant. 

Cyborg Citizen develops and explores numerous themes, from cyborgs in sports, which highlights the uplifting example of a 49-year-old who climbed Mount Everest with a prosthetic leg, to the doping of Olympic athletes, to medical practices. A short question from the medical section is, When are you dead? This is an important issue for harvesting organs for transplants. Is it when you are brain dead or when your heart stops? When you die, are you a neomort or a living cadaver? The dire need for more organs for transplants has led to some horrific cases of missing street children whose organs can be sold, or the research and development of xenotransplantation, organs from animals. As well as these concerns, plus issues of democracy and the future of war, the book covers the more normally private areas such as reproduction and sex.

Although the book develops these topics, the underlying theme is the politics and political implications of what is happening and potentially what could happen. At the start of Cyborg Citizen, Gray outlines his reworked 10 amendments of human rights (as in the U.S. constitution) to give his “Cyborg Bill of Rights” (p. 27):

Amendment 1—Freedom of Travel
Amendment 2—Freedom of Electronic Speech
Amendment 3—The Right to Electronic Privacy
Amendment 4—Freedom of Consciousness
Amendment 5—Right to Life
Amendment 6—Right to Death
Amendment 7—Right to Political Equality
Amendment 8—Freedom of Information
Amendment 9—Freedom of Family, Sexuality and Gender
Amendment 10—Right to Peace

These 10 amendments are to be accorded to every future citizen, with a redefinition of the term citizen away from old restrictions such as male, White property owner to anything that can “convince a simple majority of 12 other citizens that it can be part of their conversation” (p. 26), this being based on the famous Turing test. The importance of this redefined Turing test for citizenship is that it is not based on any other quality but intelligence to discuss and that it can never include nonbeings such as corporations or political bodies.

As mentioned, the underlying theme of the text is political, the power of the government or military and their often overt desire for control and its effects on democracy. The Internet is frequently discussed in the book as a technology that is “cyborging” people. The control or information that can be gathered by the military and governments from the Internet provides a good example of the fears for future cyborgs. Programs that collect, store, and decrypt information for governments on Internet users have been so far avoided by a number of innovative methods, such as
sales of T-shirts with the code of one particular decryption program that the U.S. government was claiming to be a weapon. But, the concern still exists about what the Internet (which was once controlled by the U.S. military) can be legitimately used to accomplish. On a positive note, Gray highlights examples of how the use of the Internet has been actively involved in promoting democracy by being used by dissidents and revolutionaries, such as the Mexican Zapatista, to promote their causes, bring down powers, or, in the case of the Czech “Duha” (Rainbow) environmental group, to collect and disseminate uncensored information.

The human genome and its potential treasure chest provide another plethora of subjects for close examination and concern. The issue of cloning brings out passions in many people, whether it be the possibility to clone humans or the ethics of cloning animals for xenotransplants. Numerous court cases in the United States over patent rights show that the issue of human DNA is a lot closer to home than was first thought. In one Supreme Court ruling, it was specified that humans could not be patented because this would mean slavery—strike one for democracy—but a subsequent ruling stated that John Moore, a leukemia sufferer, had no property rights to “the tissues of his own body” (p. 117). So, where does the person end, and where do the patentable “bits” begin?

Gray best sums up the future of our cyborged selves by saying that

cyborg technoscience renders mass society a thing of horror . . . but reaching toward greater democracy, stronger citizenship, and a proliferation of human and posthuman possibilities is our only choice besides a turn to the past . . . . [that] would make the Holocaust and the Gulag look like dress rehearsals. (p. 201)

According to one blurb on the back cover, this book is “readable by people with all different levels of technological sophistication.” Although this is true, it is helpful if you have access to a very large, up-to-date dictionary when you are reading it, because the technospeak can sometimes be slightly overwhelming, especially in the first couple of chapters, and there is often the assumption that these words are understood by all. I had high hopes that the Internet site would provide a dictionary of technospeak, but I was disappointed. Different readers will be able to connect to different areas of the book more easily depending on interests, but as a whole, the book introduces, worries, entertains, shocks, and enlightens. Although it is far from being light bedtime reading, Cyborg Citizen is a book to read if there is interest in the future of the strategic interface between the organic and the machine, or to put in another way, if you are interested in the future of all us “posthumans.”

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The emergence of genetic engineering in the fields of medicine and agriculture and as an antidote to ecological decline has brought with it public debate and an exposure of deep uncertainties that have the potential to unhinge the way we think about the world within and around us. What does it mean to grow, sell, and be nourished by food? What is the nature of human health? How is it that complex
biological processes can now be legally attributed to human innovation? The movement against genetic engineering has been inspired by ethical issues, consumer concerns about food safety, and the prospect of environmental hazards. This widespread grassroots opposition contests the substantial power and reach of biotechnology corporations and supporters in a watershed encounter rich in consequence.

From within this controversy, *Redesigning Life?* responds to the industry presentation of genetic engineering as inevitable progress, challenging the extensive and seemingly permanent incursion of new biotechnological solutions to health, environmental, and agricultural problems. In rejecting the promise of genetic engineering, the book presents a strong and motivating case against the technical achievement and commercial application of this new biotechnology and the worldview that made it possible. It explores alternatives to genetically engineered solutions, advocating organic and biodiverse agriculture and new ways of thinking about disability, health, nature, and life itself. Importantly, the book presents a rich documentation of the wide range of the hazards of genetic engineering technologies—past, present, and future—while maintaining the position that exposure to these disturbing risks is unnecessary.

Comprising 31 chapters of diverse contributions from 26 prominent scientists, activists, and academics, this substantial book is organized into four parts. Each section addresses a key subject area within the broad field of genetic engineering, with Part I examining the impact of genetic engineering in the areas of food safety, ecological integrity, and agriculture. This opening section exposes the environmental and human hazards of Round-Up ready and Bt (*Bacillus thuringiensis*) crops, recombinant Bovine Growth Hormone, and the future and imminent threats to ecological integrity from a wide range of genetically engineered products. Such modifications are touted to bring about sustainable agriculture, yet are revealed to only further intensify the problems of industrialized food production. Because engineered “environmental benefits” are at best short lived, pesticide use will ultimately increase, as will antibiotic resistance and the creation of new toxins, viruses, and allergens. The risks of commercializing genetically engineered “solutions” are illustrated in the example of vitamin A rice as an antidote to blindness and vitamin A deficiencies in the so-called Third World. This innovation neglects the basic human need for a diverse diet and ignores other aspects of malnutrition that accompany such deficiencies while also posing the further risk of vitamin A poisoning. The scope and authority of the book’s critique competently and powerfully belies industry criticism of anti–genetic engineering sentiments as unethical responses to a hungry world in crisis, born of fear and irrationality. With university scientists increasingly linked to industry funds and priorities, the critical evaluation of biotechnology offered by *Redesigning Life?* is crucial.

Part II examines the implications of genetic engineering technologies in the spheres of medicine and human rights. Tokar acknowledges in his introduction to this section that people are less inclined to resist medical applications of gene technology than to challenge its use in food production because the promise of alleviating human illness, pain, and suffering is very persuasive. This section addresses the issues of gene discrimination, the disturbingly prominent place of eugenics in human germline modification, racism in gene-based social research, and the dangers of “gene therapy” and xenotransplantation. Importantly, it demonstrates that a biotechnological approach to health necessarily downplays environmental and societal considerations. The classification of health problems in purely genetic terms casts disease as a condition that requires the biotechnological solutions offered by industry. In this model, culpability for illness effectively falls to the indi-
vidual, while wider causes of disease are left unexamined. Instead of seeking to redress the toxicity of environments or the pressures of poverty, the technological focus shifts conveniently to those who suffer the genetic predispositions that make them physically vulnerable to stress and the pervasive poisons of the industrial world. In reproductive medicine, efforts and funds are channeled into invasive responses to fertility problems, of which women bear the burden, without asking why so many couples are unable to conceive. The claim that this genetic technology benefits humanity is destabilized by the necessary exclusion of wider causes of illness and when the extent of economic imperatives and rewards for such advances are revealed.

The promotion of biotechnological solutions has been made possible through the reconceptualization of humans and nature into a genetic framework. This reductionist view presents genes as primary causes and promotes the vision of the gene as a simple building block that is interchangeable, controllable, and predictable. The book challenges this vision on scientific and philosophical grounds, offering a different view of the gene as existing in a complex network of biological and environmental relationships and processes.

Part III addresses the consolidation of biotechnological corporate power through patents on life and bioprospecting, both of which assume simple and predictable gene expression. In the United States, Diamond v. Chakrabarty opened the gateway for patenting life forms, with the court ruling in 1980 that the patenting criteria of novelty, usefulness, and nonobviousness did not preclude patents on life forms, as long as they were “human made.” The subsequent preservation of biodiversity in anticipation of creating patentable and marketable commodities, the controversy of such patents as constituting theft, and the effect of these and other gene technology practices on indigenous people are explored in depth. The focus of this section establishes the ways in which a legally and economically sanctioned position that attributes natural processes and live biological materials to human innovation is everyone’s concern and so substantially contributes to the book’s pertinence as an international text.

Although some opposition to genetic engineering calls for a decoupling of the technology from monopolistic corporations and the drive for profit, this volume argues that gene technology is intrinsically entrenched in the corporate and globalized context from which it emerged and cannot be democratized. Overwhelmingly, the book presents a united front against genetic engineering technology on a variety of issues, while ample chapter cross-referencing establishes and reflects a cohesive and substantial network of themes and information.

Part IV presents international stories of resistance, recounting tales of activism and relaying campaign successes and failures. The focus here is on grassroots challenges to genetic engineering in agriculture and food, fulfilling Tokar’s acknowledgement that other applications of gene technology often escape comparable scrutiny. Curiously, the book concludes in a departure from its established tone with an overview by Chaia Heller of the social, cultural, and economic shifts that allowed biotechnological solutions to gain ground. This chapter positions the campaign against genetic engineering within a wider resistance to a powerful, pervasive, though seemingly gender neutral “recombinant culture.” Heller differentiates her analysis from the preceding chapters that seem to celebrate grounded displays of defiance—such as the rejection of genetically modified foods from supermarkets and the destruction of trial and commercial crops—by positioning such actions as meaningful only within a longer term vision of radical social transformation.
dented cross-spectrum of people, and the book’s strong focus on genetic engineering technology as the core issue, I felt that this lone and not necessarily representative analysis presented a slightly incongruous conclusion. However, this final chapter ultimately works to deepen the case for resistance and expands on the key theme of “people power,” calling for a direct democracy to “retrieve the notion of citizenship from the category of consumer” (p. 416).

Across the spectrum of chapters, genetic engineering is often regarded as breaching what is sacred: farmer autonomy, the miracle of birth, the inner workings of the human body, biological processes that give rise to interactive living systems, the species barrier, and nature’s long process of coevolution. The repeated documentation of genetic engineering technology as a violation of what is cherished exemplifies the book as one that is in dialogue with a politically active issue. Its audience by necessity resides within the genetic engineering conflict. Hence, although the book offers its audience vital information to arm themselves, as a highly contemporary text, its scope in confidently prescribing precise “next steps” is restricted. Part IV highlights this dilemma in revealing how complex and unpredictable the outcomes of actions against genetic engineering can be, yet the book remains firm and justified in its message to maintain resistance in myriad ways, concluding with an impressive list of resources for information and action. With its international focus and cross-disciplinary authorship, the book is a comprehensive resource applicable for a global audience and compulsory for anti–genetic engineering activists.

—Samantha McLean
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As someone who is instinctively sceptical of economics and economists, I was pleasantly surprised on reading this book by an economist on such contentious issues as free trade, environmental degradation, and economic growth, which did not simply trumpet the orthodox and dominant “proglobalisation” rhetoric and viewpoint. Although by no means a radical, Cole does at least discuss alternative economic perspectives. He also subjects the relationship between free trade, economic growth, and environmental degradation to empirical analysis (albeit, of course, framed within the discipline of neoclassical environmental economics) as well as integrating his econometric analysis with reviews of previous empirical/econometric studies, the basic thrust of which adds weight to the environmental critique of free trade.

What is missing from Cole’s book, however (and how could it be otherwise, given the paradigm within which he writes?) is a “political economic” analysis of these relationships and processes. Although Cole does discuss the historical origins of the World Trade Organization (WTO) and the “free trade” agenda, there is no complementary discussion of resistances to globalisation or the role of multinational corporations and particular nation-states in organising globalisation. Cole does, of course, recognise the institutions of “free trade” and the creation of an open, rules-based, global free market. But, the lack of analysis devoted to the interest groups, actors, and dynamics of these institutions leaves the impression that
from a neoclassical economic point of view, the global free trade agenda is a spontaneous, natural phenomenon rather than something that is actively organised, managed, and promoted by particular economic and political actors, institutions, and interests, for particular reasons and with certain consequences and aims in mind.

In terms of the issues raised in the book, Cole does discuss the main arguments of those who claim that the globalisation agenda is good for the environment. A key argument here is what can be called the “Achilles’ lance” hypothesis, which is that economic growth (stimulated by increased free trade), like Achilles’ lance, can heal the ecological wounds it inflicts. The reasons for this are that “trade liberalisation mitigates environmental damage through increased income growth” (p. 23) and “as the scale of economic activity expands, then so do the financial resources available to protect the environment” (p. 26).

The inherently antienvironmental character of the WTO is identified by Cole in that although the infamous Article XX of the General Agreement on Tariffs and Trade does allow restrictions on trade on the grounds of environmental and health protection arising from the consumption of a good or service, this is not the same when it comes to the production of goods and services. As Cole puts it,

The WTO does appear to allow trade restrictions in order to prevent environmental damage which results from the consumption of a good. However, with regard to damage resulting from the production of a good or service, trade restrictions are generally not allowed under the WTO. . . . trade restrictions are not allowed in support of regulations which control those foreign production processes which are not detectable in the final product. Furthermore, the WTO does not allow nations to implement trade restrictions in response to environmental damage which occurs outside their jurisdiction. (p. 35)

What this means is that under WTO rules, there are no grounds for restricting “like” goods and services that are produced under different conditions. So, a good produced using methods that are extremely environmentally damaging but that is otherwise the “same” as like goods produced using different production methods cannot be subject to trade restrictions on the grounds that it was produced using or resulting in environmental degradation or pollution. Cole rightly suggests that this is untenable:

The WTO does not allow nations to distinguish between “like” products which have very different production methods. Nations have traditionally been allowed to do as they please within their own borders, but in an ecologically interdependent world, where production processes in one country can affect the global environment, such a notion may be outdated. (p. 36)

All of this seems to support the common environmentalist view of the “trade liberalisation” agenda and the WTO in particular as inherently antiecolological.

Unfortunately, Cole does not proceed with this argument beyond suggesting that the rules of the WTO should be changed (p. 118), preferring instead to place his hopes on a more “balanced” resolution of trade-environment disputes on the emergence of a strong world environment council (pp. 118–122) to counterbalance the WTO. Yet, from a realistic political economy perspective, it is difficult to see how (a) such a body would arise and (b) how it would have the power to challenge the WTO (unless it does so as the burden of proof in trade-environment relations is shifted away from a protrade to a proenvironment agenda).
An odd feature of the book (which perhaps reflects the dilemma of working within a paradigm that cannot accommodate the results of one’s analysis yet that one does not or cannot reject or significantly amend) is that although I read his conclusions to indicate that trade liberalisation, compounded by increased economic growth (if left to themselves), would damage the environment, at various points in the text, Cole articulates a bias clearly in favour of the proliberalisation position. In his words,

The results and discussions within this book suggest that trade liberalisation has the potential to damage the environment. Amendments to the workings of the WTO could alleviate this damage, to an extent, but in the presence of externalities such damage is likely to continue. (p. 129)

Yet, on the basis of Cole’s empirical-econometric projections, it is clear that trade liberalisation leads to increases in pollution (located in the South) and that the empirical data demonstrate a shift of polluting industries to the developing world, which rather undermines his emphasis on the Achilles’ lance argument as provided by the environmental Kuznets curve (EKC) hypothesis.

The EKC hypothesis is that economic growth is compatible with improved environmental quality in that after a turning point, the relationship between economic growth and environmental degradation is a U-shaped curve; that is, continued economic growth is consistent with less environmental damage. However, although this sounds like a very strong (and, of course, powerful political) proposition, the theoretical, methodological, and empirical evidence Cole provides for his own enhanced version of EKC analysis is, to say the least, weak. Theoretical and methodological weaknesses are evident in the following statement:

EKC regressions are reduced [sic] form [sic] relationships and hence only indicate correlation rather than a causal mechanism [italics added] between economic growth and the environment. Nevertheless, the consensus across studies is that, in terms of local air pollutants at least, economic growth has been associated with reduced environmental damage. (p. 65)

Not only is the EKC analysis not a causal relationship between economic growth and environmental damage, but the environmental damage that it is correlated with is limited to local air pollution, thus not including other forms of environmental damage, from biodiversity loss to ecosystem and habitat destruction to nonlocal forms of ecological degradation such as carbon emissions.

But, the EKC hypothesis as a firm basis for positing a benign relationship between free trade, economic growth, and the environment is further weakened when, after running his empirical analysis, Cole concludes,

Results indicate that most developing and transition regions will experience an increase in emissions of all five pollutants [nitrogen oxides, sulphur dioxide, carbon monoxide, suspended particulate matter, and carbon dioxide] as a result of the Uruguay Round. In the developed regions, emissions of all three local air pollutants are predicted to fall whilst emissions of nitrogen oxides and carbon dioxide generally rise. . . . this analysis indicates that trade liberalisation may result in some degree of environmental damage, particularly in the developing regions as a result of increased emissions of local air pollutants and perhaps globally for carbon dioxide emissions. (p. 110)
So, the minor local pollution abatement improvements of the EKC hypothesis (a) are limited to three of the five chosen pollutants in the North, (b) are consistent with increases in local pollution in the South across all five pollutants, and (c) will also increase global pollution in the form of carbon emissions! The data all seem to unequivocally point to the fact that trade liberalisation will lead to local and global environmental damage, yet Cole does not clearly state this, offering the rather weak (if predictable) view that trade liberalisation “may” cause “some” environmental damage.

The analytical and explanatory weaknesses of Cole’s book, good as it is (despite all my problems with it), arise out of its neoclassical environmental economics framework and demonstrate the absolute need for a “political economy” as opposed to an orthodox “economic” analysis of trade liberalisation. The first stage in this transition from the confines of neoclassical environmental economics to a political economy (or political ecology) is to place trade liberalisation squarely within the discourses, practices, debates, and struggles around “globalisation.”

Thus, although Cole does not go so far as to abandon the neoclassical framework as inadequate and inappropriate to examine the complex relationship between the human and the natural economy, and at times (to this reader at least), it felt as if he balked at the logical conclusions from his theoretical and empirical arguments and data, Cole does, I think, take us to the limits of the explanatory and political usefulness of the neoclassical environmental economic paradigm in relation to economic globalisation. He does not escape the “iron cage” of his discipline (and its limits), but he does at least rattle the bars, and for this, Cole is to be commended.

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