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Marxism, ‘manufactured uncertainty’ and the ecological crisis

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Anthony Giddens has argued that we live today in a world characterized by ‘manufactured uncertainty’ or risk and that this marks a decisive shift in our relationship to scientific and technological development.¹ We used to think of progress in terms of ‘controlled intervention’ into nature and society guided by advances in science and technology, but we now confront manufactured risk which is a result of these developments. Thus the source of risk has been turned around: knowledge and control have become the problem, not the solution. A particularly consequential form of manufactured uncertainty, which constitutes Giddens’ core concern, is the ‘ecological crisis’ which is a consequence of human intervention guided by an essentially instrumental view of nature. In this world, Marxism is moribund because it exemplifies this instrumental or ‘Promethean’ view.

This article examines this claim with reference to Marxist thought. Giddens is criticized for linking the ecological crisis with industrialism per se and failing to trace its origins to systemic and motivational forces characteristic of capitalism. However, this response does not demonstrate that socialism will ensure, rather than permit, a non-instrumentalist approach to nature. The relationship between Marxism and ecology is examined in terms of the central claims of the theory of history, and specifically that capitalist development creates conditions in which socialism is both possible and necessary. The old-fashioned version of the theory, as propounded by Cohen, envisages the rise and fall of economic structures in terms of social limits to the development of productive forces and has no place for a concept of natural limits.² This article develops a version of the theory which incorporates a concept of natural limits and allows three scenarios concerning socialism’s status and prospects to be sketched. It is argued that socialism must now have ecological concerns at its heart and must recognize the limits to a rational and technically sophisticated intervention in nature in the face of manufactured uncertainty.

Marxism’s Promethean approach to nature?

Giddens contends that the ecological crisis clearly reveals the bankruptcy of socialism for ‘the dominant forms of socialist doctrine have no place for nature as a “partner” of humanity. Nature is looked at above all in an instrumental way’.³ Socialism cannot, it seems, regard nature as a partner because the progress of humanity for which it speaks is predicated on mastery of nature. Thus

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in Marx, nature appears above all as the medium of the realisation of human social development ... [and the] concern with transforming the exploitative human social relations expressed in class systems does not extend to the exploitation of nature ... the ‘Promethean attitude’ is always pre-eminent in Marx’s writings. 

Similarly, according to Benton, Marx’s writing ‘suggests an underlying antagonism between human purposes [that is, autonomy] and nature: either we control nature, or it controls us!’ And Eckersley claims that ‘Marx ... consistently saw human freedom as inversely related to humanity’s dependence on nature’. In a world of manufactured uncertainty, manifest in ecological threats, this approach is untenable, for it promotes the very technological ‘progress’ which is at the origin of these threats.

However, against this view, Foster argues that ‘the domination of nature was seen by ... [Marx and Engels] ... as a phase of historical development ... which would necessarily have to be transcended under communism’. Thus the ‘Promethean attitude’ is characteristic of capitalism and is an important element of the critique of this system, whereas Marx and Engels incorporate a modern conception of sustainability into their vision of communist society. Part of the evidence given for this view of Marx is the inclusion, among the measures to be taken by the proletariat once organized as the ruling class, of ‘improvement of the soil generally in accordance with a common plan’. The problem, as Marx and Engels see it, is that capitalist relations of production engender the relentless drive to dominate nature which results in ecological harm (such as degradation of the soil) and it will be part of the task of socialism to repair this damage, indeed to instate a relationship to nature as a ‘partner’ of humanity. Contrary to Giddens, who links the ecological crisis with the technological base (industrialism) per se, this view emphasizes the character of the prevailing economic structure. The point is that the economic structure is the form of development of the productive forces, which constitute the material content—the latter cannot develop themselves. It follows from this that ecological threats which arise immediately from development of the productive forces are indirectly, but more fundamentally, attributable to the economic structure. The Marxist position is not that it is the bourgeois form rather than the technological content that is the problem, but that the problematic nature of the content is derived from the form. Eckersley is then wrong to claim that ‘Marx’s contempt for the relations of production did not extend to the rapidly expanding forces of production of his time’. It would be better to say that Marx recognized science and technology as potentially or in principle ‘benevolent forces’ yet criticized capitalism for its tendency to direct these forces into ‘rapacious and destructive channels’. In other words, productive development under capitalist auspices is viewed as contradictory, as at once progressive and destructive, good and bad: on the one hand such development is welcomed ‘as the harbinger of freedom in creating the material and social preconditions for a socialist society’ yet, on the other hand, this very development is carried on at the cost of environmental damage. Contrary to Giddens’ interpretation, in the environmentally sensitive Marx presented to us by Foster, the concern with ending exploitative human social relations is indeed matched by a concern to end humanity’s exploitative relation to nature.
There are certainly powerful reasons to believe that capitalism, by its very nature, exacerbates environmental risks associated with productive development and economic growth: its greed for surplus value and bias towards expansion of output; its individualism and calculus of internal or private costs and benefits; and the commodity fetishism which tends to conceal the natural origins of use-values. The tendency of capitalist development to come into conflict with natural limits may be compared with Marx's analysis of how 'in its blind unrestrainable passion, its werewolf hunger for surplus-labour, capital oversteps not only the moral, but even the merely physical maximum bounds of the working day'. In this analysis the 'hunger for surplus-labour' derives not simply from the desire of the individual capitalist to 'get the greatest possible benefit out of the use-value of his commodity' but because 'as capitalist, he is only capital personified'. In other words, the coercive force of competition induces this behaviour. The same motivational and systemic forces also lie behind the instrumental orientation to nature. Thus Cohen argues that competitive pressure induces a continual search for productivity improvement as a basis of continued competitiveness. This system-induced productivity growth is manifest in expansion of output (rather than reduction of toil) since capitalists seek the profit derived from increased output and sales to maintain competitive strength. Hence, capitalism has an in-built bias towards output expansion and, in virtue of this, tends to come into conflict with natural limits since 'the pressure to sustain and expand output makes for a more rapid exploitation of existing resources than could otherwise be expected to occur'. The over-exploitation of nature which capitalism engenders is also encouraged by the form of environmental costs as 'externalities' which do not enter into the calculus of the circuit of capital: market prices do not reflect the preferences of third parties, including future generations, who may suffer loss of amenity from depleted resources or burdens in the form of, for example, pollution of the environment. Finally, Soper argues that the analysis of commodity fetishism can be extended to show how the exchange relationship masks not only the source of value in labour but also in nature, so that capitalism fosters an unawareness of ecological damage associated with output expansion. This analysis of capitalism, particularly the relentless drive to expand commodity production, 'is of cardinal pertinence to the green critique of industrialism'. It shows, contrary to Giddens, that this critique is largely misdirected if its target is industrialism per se and not the specific dynamic imparted by its capitalist form. The high-consequence risks of ecological crisis are related directly to industrialism, but the deeper connection is to capitalism. It follows that the goals of the green movement bring it in conflict with the operation of capitalism as an economic system. But, still, it is not clear that this creates grounds for alliance with socialism.

The very process of capitalism giving way to socialism will remove the prime causes of ecological crisis because the key systemic and motivational forces—competition and the profit motive—that generate the destructive ecological tendencies of capitalism will cease to operate. However, this important fact is not sufficient because it is not a reason for confidence that the leap from the capitalist frying pan will not land us in the socialist fire. Are there reasons to believe that socialism will not substitute its own 'instrumental' or 'Promethean' approach to nature for the capitalist one? That socialism will
regard nature as a 'partner' of humanity? If there are reasons we will find them in an account of the distinctive systemic and motivational forces of socialism.

The environmental degradation created by 'really existing socialism' is, to begin with, not comforting. This experience has certainly been a barrier to closer ties between socialism and the green movement, and means that we do not have a model of an ecologically responsible socialist economy. The experience can reasonably be discounted by arguing (a) that these societies fell a long way short of institutionalizing socialist principles, and/or (b) that the ecological damage was in large part a product of the particular historical circumstance of backward economies attempting to catch up with the West through rapid industrialization. Nevertheless, we still need reasons to believe that socialism could, in principle, improve upon the performance of both these and capitalist societies in ecological terms.

The primary rationale of socialism is to end class exploitation through the abolition of private property and the concentration of all production 'in the hands of a vast association of the whole nation'. With the abolition of private property, exchange, competition and profit, economic life in socialist society will not assume the form of an autonomous process beyond the control of human agents as it does in capitalism, but will be subject to conscious and rational direction by the associated producers. In place of the systemic bias towards output expansion and the ecologically destructive tendency of capitalism this will permit reduction of toil to be traded against increased output, and regulation of the interchange with nature to ensure sustainability.

However, all depends on the motivational forces operating in socialist society. That socialism will permit collective choice in favour of reduction of toil does not allow a prediction that this choice will be made. Though it is arguable that this choice would be rational, still we cannot be sure that a capitalist mentality in favour of output expansion will not persist. Foster argues that, for Marx,

devising a sustainable alternative to the destructive ecological tendencies of capitalist society ... required ... a shift to a society controlled by the associated producers, characterized by the expansion of free time and collective-democratic organization, and hence by a non-instrumentalist approach to nature and human society.

It is clear that socialism will transcend the domination of workers by capitalists (and hence the instrumental approach to labour, to human society) since socialism is by definition classless, but a non-instrumental approach to nature cannot be deduced in the way suggested from collective-democratic organization of economic life. A non-instrumental approach to human society is at the heart of what socialism is by definition, but the same cannot be said of a non-instrumental approach to nature. As Soper argues

there is nothing overt in Marx's argument that associates socialism with a restraint on material and resource-intensive forms of production or with a use of surplus/free time that would be obedient to environmental limitations on the expansion of certain forms of consumption.

This conclusion is strengthened by a consideration of the motivational forces which direct socialism as a politics of emancipation as revealed in conventional
accounts of class struggle, revolution and socialist values. The Communist Manifesto is a good place to start. Although improvement of the soil is cited as one of the priorities following successful revolution, it is striking that ecological destruction plays no part in the analysis of the movement ‘going on before our own eyes’ of capitalist development leading towards its own dissolution. As Foster acknowledges, ‘ecological considerations ... play little or no role in the anticipated revolution against capitalism’. That is, they play no role in the motivation to overthrow capitalism and replace it with socialism, they do not figure in the grievances which animate this struggle. This being so there is nothing in the classical Marxist account which suggests that ecological considerations will be weighty in socialism. If they are not reasons for making the journey why should they become such when we arrive? Foster says that Marx and Engels, perceiving revolution as imminent, therefore considered ‘ecological problems ... as having more bearing on the future of communist than capitalist society’. Whereas today ‘the ecological contradictions of capitalism have developed to the point that they will inevitably play a large role in the demise of the system’. But this is not really convincing. Of course ecological problems are more pressing today, yet there is plain inconsistency in Marx criticizing the ecological destructiveness of capitalism in his time while deferring any response to an indefinite future. In any case, a more telling point against Marxism is the absence of ecological concerns in standard accounts of Marxist values, even today when their role in the demise of capitalism has become ‘inevitable’. Thus, in one recent account, classical Marxism involves a politics of emancipation which includes adherence to a set of Marxian values: equality, self-realization, and community. What socialists want, from this list, does not extend to partnership with nature.

Thus Foster’s case for an eco-friendly Marx (and Marxism) is not successful. It has two parts. The first part, which emphasizes the importance of economic structure and, specifically, reveals the ecologically destructive tendencies of capitalism, is convincing. The second part, that socialism will offer a sustainable alternative, appears plausible in asserting that socialism will permit such an alternative but fails to offer a convincing argument that it will necessarily do so, and that is because ecological concerns do not figure in the motivational forces of the Marxist politics of emancipation. Is it possible, then, simply to graft ecological concerns onto Marxism, to extend the set of values to which the politics of emancipation adheres? Against such a possibility must be weighed the argument of Benton and Eckersley, introduced above, that there is an antagonism between Marxist values, especially autonomy, and nature, and that the ‘Promethean attitude’ to nature is at the heart of Marx’s theory of history. If there is a problem of antagonism between Marxism and ecology it is found deep within the ‘theory of society’ branch of the classical Marxist project. That is because, as theory of history, Marxism is a theory about technological progress, whose central theoretical claim, upon which all else is based, is that there is a tendency throughout history for the forces of production to develop, and that this development is what the idea of progress refers to. The problems posed for a reconciliation with ecology stem from the following claims:

- Economic structures rise and fall accordingly as they promote or fetter development of the productive forces conceived in terms of control and
transformation of nature. The theory only recognizes social limits to the progress of the productive forces in the shape of fettering production relations which, consistent with the ‘development thesis’, are sooner or later ‘burst asunder’. There is no role in the basic concepts of the theory for natural limits.

- Consistent with the first point, the possibility and necessity of socialism are conceived in terms of a baseline level and further progress of productive development. The material precondition of socialism is the overcoming of scarcity through the attainment of abundance or ‘massive surplus’.
- The ‘development thesis’ rests upon a theory of human nature which depicts productive progress as a fundamental human interest.
- The idea of abundance as the basis of the socialist good life involves a conception of human mastery of nature as unproblematic, free of manufactured risk.

The theory of history, development of productive forces and social limits

Marx’s theory of history claims that there is a tendency for the productive forces to develop, which ‘is very largely the growth in knowledge of how to control and transform nature’, and which ‘in its higher stages therefore merges with the development of productively useful science’. This development is measured in the growth of productivity, and hence the ability of the forces to generate a growing surplus product. The central explanatory claim of the theory is that the level of development of the productive forces explains the character of the prevailing relations of production, or economic structure. In Cohen’s reading of the theory, economic structures arise and persist because and so long as they constitute forms of development of the productive forces, and perish when they become fetters, when they retard or block rather than promote further development of the forces. They are replaced by higher relations of production which correspond to the level of development of the productive forces, in the sense that they constitute forms of development. Thus, the theory depicts history as a process of productive development coming up against and transcending social limits posed by existing production relations which have become fetters.

The productive forces develop because the relations of production within which they are held are propitious, but the relations are selected for this reason by ‘men’ who are intelligent and rational and desire to make further inroads into the scarcity which marks their historical situation. In this sense there is an underlying autonomous tendency for the productive forces to develop which explains the character of prevailing relations of production. The point of Marx’s theory of history is not that it expresses a normative viewpoint that the improvement of productivity is, above all things, a good which humankind should pursue. It is rather that, like it or not, a fundamental component of human nature is the desire to take advantage of advances in knowledge to control and transform nature and thereby realize the material benefits of a larger social product. In other words, the development thesis is a descriptive/explanatory claim about the overall direction of history which rests on a philosophical anthropology or theory of human nature. It is because human
Marxism, 'manufactured uncertainty' and the ecological crisis

nature is what it is that history is as it is—a story of development of the productive forces and of a succession of economic structures.

According to the theory, socialism only becomes possible when the forces of production have been developed to a very high level—the 'historical task and justification' of capitalism is to develop the forces to that level. At this point socialism also becomes necessary because capitalism turns into a barrier to further productive progress. The past development of the productive forces makes socialism possible, and their future development makes socialism necessary. Capitalism, like all previous economic structures, can only develop the forces of production within a certain range—it can only get going when the forces have developed to a certain level (being the material precondition of this form of economic structure) and is only a 'form of development' of the forces up to a certain, higher, point. These points or levels of productive force development correspond, of course, to epochs of social revolution, to periods of transition from lower to higher economic structures. The definition of these points or levels is somewhat loose. They are probably better conceived as ranges of development—over some range the existing structure begins to fetter development of the forces of production, this overlaps with the base level at which a higher structure becomes possible, and at some point within this overlap a successful transition occurs. These levels or ranges of productive development are measured in terms of the size of the surplus conceived in four stages corresponding to forms of economic structure: none, some, moderate, and massive. In this schema capitalism requires moderately high surplus as its historical precondition and its task is to carry on productive development to the level of massive surplus or abundance which is the precondition of socialism.

The transition from one economic structure to a higher form thus presupposes coincidence between the existing relations fettering the forces and the objective possibility of new higher relations. Looked at more closely there are two aspects to this. The first is that the theory must assume that the existing economic structure always carries productive development far enough, that is to the level at which a new structure is possible. If fettering occurs at too low a level of development (so that higher relations are necessary but not possible) then the progress which is supposed to characterize history will founder. The second aspect is that the theory must assume that when new relations are possible the existing relations begin to act as fetters. If there is room within the existing structure for further productive development (so that higher relations are possible but not necessary) the transition between economic structures which is supposed to characterize history will be postponed, perhaps indefinitely. That progress will not founder completely or continue without structural transitions depends (in Cohen's reading) on: the plausible claim that no economic structure can effect productive development without limit (i.e. social limits); the historical possibility, at that point, of a higher form of economic structure capable of taking up productive progress where the existing one leaves off; and the, arguably less plausible, idea that men, being rational and intelligent, will 'select' these higher relations of production when fettering occurs. Although the theory does not require that all societies pass through a pre-given sequence of economic structures (the routes to capitalism may be varied, and it may be possible for particular societies to leap over
capitalism in propitious international circumstances), capitalism and socialism both appear to be necessary as the only, or at least best, economic structures possible at the stated levels of productive development. The transition from capitalism to socialism requires that capitalist relations of production constitute 'forms of development of the productive forces' up to the level of abundance at which point 'these relations turn into their fetters' so that socialism is both possible and necessary. Why should this coincidence be expected? In Cohen's reading, fetttering of the productive forces is manifest in economic crises, so the question becomes 'why should the time when [capitalism] has raised a technology which permits a transition to socialism also be a time when it suffers especially violent economic crisis?'

Cohen's answer is that capitalist development both develops the forces of production (maturing the conditions in which socialism becomes possible) and generates crises of increasing severity (matur-ing the conditions in which socialism is necessary) and at some point, which is the moment when 'the proletariat is sufficiently class-conscious and organised', the transition occurs. Thus there is an (indeterminate) overlap between the fetttering of the forces by capitalist relations of production and the base level of productive development from which socialism becomes possible, and the transition is not determined by these propitious economic circumstances alone but, crucially, by the state of the class struggle.

In Cohen's reading, Marx does not consider as a possibility that capitalism might not develop the forces of production far enough to make socialism possible. This is because although fetttering occurs (in the form of economic crises) from the beginning of capitalism (i.e. even in its progressive phase), productive development continues throughout so that the forces of production are always at a higher level of development on the eve of a crisis than they were on the eve of the previous one. It follows that productive force improvement will continue until the base level for socialism is attained. Once this base level is passed, productive force development will continue under capitalism. Capitalist relations of production do not appear to follow the historical pattern that from forms of development of the forces they turn into fetters—rather they are both simultaneously and are so from their inception. The theory of capitalist development which predicts that capitalism must at some point create the crucial material preconditions of socialism also predicts, by extension of the same argument, that capitalism will go on developing the forces of production as long as it is allowed to. Why might it not be allowed to do so indefinitely? Why is socialism not merely possible but necessary (inevitable)? Cohen says, in the quote given above, that the future development of productive forces makes socialism necessary. Yet it cannot be simply that, since such development will continue anyway. It is not, in other words, that capitalism is no longer a possible form of development of the productive forces so that socialism is necessary if such development is to continue. Both capitalism and socialism are possible economic structures in this sense. If socialism is necessitated in order to secure future productive development it must be because socialist relations of production will be superior forms of development of the forces, capable, that is, of securing a higher rate of productivity improvement and growth of output. We might further conjecture that, as capitalist crises intensify, the superiority of socialism over capitalism increases (there is a widening gap between what is achieved under capitalism and what could be
achieved in socialism). Capitalism does not turn from promoter to fetterer of productive development but the balance between these two effects shifts from the former to the latter, and socialism becomes increasingly attractive as a result. This view of the necessity of socialism complies with the general explanatory claims of the theory.\textsuperscript{44} The transition to socialism occurs for the same reasons as all earlier transitions. Given the underlying theory of human nature the necessity of socialism lies in men's desire to benefit from potential improvements in productive development which are increasing and increasingly evident. Socialism is necessary, given the technical relationship which is alleged between forces and relations, if the desire for productive development is to be realized, and is likely (inevitable) because such desire is alleged to be a fundamental trait of human nature. In so far as the primary rationale of productive improvement is increased output we can designate this depiction of socialism as Output Expansion Socialism.

However, the replacement of capitalism by socialism is quite unlike any other in the quite fundamental sense that all earlier historical transitions were \textit{en route} to the overcoming of scarcity whereas the material precondition of socialism, the production of material abundance or a massive surplus, is the completion of this journey. The realization of abundance does not mean that the abiding human interest in productive development abates, but its rationale shifts. It is not clear, after all, that socialism is necessary in order to achieve a higher rate of productivity improvement, but, whatever the rate of improvement, the primary purpose ceases to be expansion of output. Cohen says that capitalism's mission is fulfilled, and its historical justification removed, once it has taken productive power through the third level/range of development (moderate surplus) to the bottom of the fourth and final level/range (massive surplus).\textsuperscript{45} However, productive development does not now cease with the economy coming to rest at an abundant 'steady state', rather socialism takes the development of productive power further within this level. Given that the potential for ongoing productive improvement under capitalism is not exhausted, why does it give way to socialism at this point if not to permit more rapid improvement? The answer, at its simplest, is that capitalism loses its justification because now, for the first time in history, the material preconditions of a classless society are in place and a classless society, because it permits liberty for the mass of mankind and 'human beings prefer freedom to its opposite',\textsuperscript{46} is self-evidently superior to capitalism. More specifically, what capitalism cannot do, on account of the systemic and motivational forces which create an output-expansion bias, is realize the reduction of toil which is made possible by the level of productivity which it has brought about. What Cohen refers to as the distinctive contradiction of advanced capitalism is that it promotes productivity 'gain' in the form of expansion of output even when, once high levels of consumption have been achieved, a greater advance of human welfare would be achieved through reduction of the working day.\textsuperscript{47} Socialism is necessary to realize this advance. This does not mean that communism is depicted as a no-growth economy, but that the basic human interest in productive improvement is focused on increase of leisure rather than consumption. Note that, on this account, the rate of productive improvement does not figure, and it may be conjectured that even if it would be superior in this respect, capitalism will still give way to socialism. The contradiction between
production relations and productive forces in advanced capitalism reveals itself in the use rather than development of the latter, and it is in their rational use that the superiority and necessity of socialism lies. The human story of productive progress through increasing control and transformation of nature will continue under socialism but will not be geared primarily to economic growth. We can designate this Toil Reduction Socialism in so far as that is the primary rationale of productive improvement.

Capitalism, socialism and natural limits

The transition to socialism is understood in terms of the fundamental human interest in productive improvement overcoming social limits to development and/or rational use of productive forces encountered by capitalism once its historical mission to create a massive surplus has been completed. This transition complies with the general conception of human history and progress in terms of ‘control and transformation of’ rather than ‘partnership with’ nature, and there is apparently no notion of natural limits to productive development. Thus, there does seem to be a tension between the ‘environmentally sensitive’ Marx and the historical materialist Marx. Ecology is a missing dimension of the theory of history. Marx’s awareness of ecological issues does not seem to inform his theory of history, and this merits further consideration.

Is it possible to incorporate ecological concerns in the theory?

A first possibility is that the idea of natural limits is already present, if only implicitly, in the definition of productive development. In that case, we would add to the claim that the forces of production tend to develop throughout history, the further—implied—idea that they do so within a natural setting and within natural limits. Such a view of the theory of history would suggest that the laws of history, which are the theory’s concern, operate within the laws of nature. The idea that human history is made within a natural setting is strongly present within the theory, for productive development is a process of interchange with nature, and the forces of production are largely elements or components of nature which are used in the process of production, such as raw materials. The question, though, is whether this interchange is theorized in terms of natural laws, and whether these laws impose natural limits which constrain productive development in a way which impinges on the central explanatory claims of the theory. In one sense the idea of natural laws is at the heart of Marx’s theory, for the knowledge of which productive development very largely consists, is essentially knowledge of the laws of nature which allows us to extract from nature an increasing product. In Engels’ phrase, our mastery of nature consists in our ability ‘to know and correctly apply its laws’. Marx’s theory is an optimistic scenario of advancing knowledge and the growing surplus which is its fruit, up to and beyond the massive surplus which is a precondition of socialism. Thus, the theory of history presumes that we can come to ‘know and apply’ nature’s laws in a rational way as a basis of what Giddens terms ‘controlled intervention’, and in an open-ended way, in so far as these laws leave plenty of room for all the productive development needed for human history to proceed towards its known destination. This presumption allows natural limits as contextual conditions of productive
Marxism, 'manufactured uncertainty' and the ecological crisis

progress to be put to one side in the theory, for they constitute a distant horizon which will not interrupt that progress.

An alternative reading of the theory of history is possible in which ecological constraints come into play and which relies on bringing the state into the theoretical framework. In effect, it can be argued that the way in which ecological constraints impinge upon the forces and relations of production is through the filter of the capitalist state which stabilizes an otherwise unstable economic structure. The theory of history claims that economic structures arise and persist because they constitute forms of development of the forces of production, but it does not claim that economic structures are self-stabilizing or self-reproducing. In Cohen’s reading of the theory of history, the explanatory primacy which the forces are alleged to exert over the relations of production, is supplemented, crucially, by the claim that the nature of the economic structure explains the character of the ‘legal and political superstructure’, that is, principally, the state. This involves commitment to a functional theory of the state which means, roughly, that the state is explained, in large measure, by its function to secure the external conditions of existence, or ‘system needs’, of the prevailing economic structure, needs which the circuit of capital cannot secure and may threaten. In Cohen’s words, ‘the capitalist state... is... the eye of the otherwise blind capitalist, the stabilizer of a system capitalist activity itself endangers’. Thus may be explained the Factory Acts in order to secure the reproduction of labour power which capitalism threatens through overwork. Likewise, we can infer from Marx’s functional theory of the state an explanation (or prediction) of regulation to secure system needs in the shape of ecological reproduction of which the system, left to itself, is similarly reckless. If this is plausible as interpretation of Marx and as explanation, it may reconcile the absence of ecological constraints from Marx’s general theory with his awareness and critique of the ecological destructiveness of capitalism in his day.

Whatever the merits of this theoretical strategy it is not a sufficient answer to the ecological challenge in the world we live in now. The state is portrayed as a mechanism which keeps capitalism on track so that it can fulfil its historical task, but the more basic question of the compatibility of ecological limits with the central explanatory claims of the theory, particularly the development thesis, is not answered. Giddens’ idea of manufactured uncertainty reveals that we are able to feel much less confident in our ability to ‘know and apply’ nature’s laws (through state regulation or a rational economic order), and the room allowed for further productive development by these laws appears more constraining.

An alternative way of incorporating ecological concerns in the theory, suggested by Hughes, involves a reconceptualization of the development thesis. Hughes argues that technological development is open to a variety of objectives and measures of progress of which improving labour productivity is only one and ‘ecological efficiency’ is an alternative. Technological progress is not necessarily more energy and resource intensive but can be conceived in terms of more efficient use of energy and raw materials and less harmful emissions per unit of output. On this alternative conception Marxism can be committed to technological development without being anti-ecological. Hughes further argues that a notion of ecological fettering better satisfies Cohen’s
'revolution constraint', in other words it is more plausible that capitalism will
give way to socialism because it is inferior at mitigating ecological damage than
because of any inferiority in terms of the rate of productive improvement. The
attraction of this approach is that it renders the theory of history apparently
more malleable, adjustable to changing circumstances. But that is also its main
disadvantage because it is not clear that what is left after this ‘revision’ is
worthy of being described as a theory of history. What gives Marx’s theory its
historical sweep, and makes it a theory of history, is that it claims to identify
and account for the basic content of history. It reveals human history, as a
whole, as a story of progress measured by increasing productive power.
Development of the productive forces is the underlying unifying theme of
history that is projected or extrapolated into the future. The reason that history
is like this, according to Cohen’s reading of the theory, is human nature—the
basic interest that humans have in taking advantage of opportunities for
productive improvement in order to mitigate scarcity. The whole point of this
concept of human nature is that it is supposed to be trans-historical so that it
is capable of explaining the trans-historical tendency of the productive forces
to develop. It is this same interest that will motivate the transition to socialism
as a system in which future development of productive forces will be largely
in the service of reduced toil. So although the notion of technological develop-
ment is amenable to diverse interpretations and measures of progress, the only
one which meets the purpose of the theory of history is defined in terms of
increased productivity, or labour-saving technological change. And if the
interest in productive development is not basic but can be displaced by rival
interests, such as ecology as Hughes suggests, then the coherence of the theory
as capable of explaining history as a whole is threatened. If ecological concerns
are supervenient in the particular historical circumstances of the world today,
other rival interests may trump productive improvement in other contexts.
Why should we believe in a basic interest in productive development rather
than a contextual interest in ecological efficiency? The plausibility of Cohen’s
account of human nature, and its strength as foundation for the theory of
history, is uncertain particularly because of the difficulty of judging ‘the
comparative importance of potentially competing human interests’. It may be
rational to seek productive improvement to mitigate scarcity but competing
interests might deflect this aim. But this weakness in Cohen’s argument might
allow Hughes’ revision to be taken. The assertion that ‘the historical situation
of men is one of scarcity’ provides, as Hughes points out, only a partial
description of that situation and, more important, scarcity is a variable condi-
tion. Indeed the central message of the theory of history is that scarcity is
progressively reduced (as the size of the surplus increases) and we might
conjecture that the force of the human interest in productive development
correspondingly tends to lessen. The greater the scarcity that men face, the
stronger their interest in productive development (and the greater likelihood
that it will outweigh potentially competing interests). As scarcity is mitigated,
the interest in productive development weakens (and the competition of other
interests is more pressing). The theory of history requires that the interest in
productive development is sufficiently strong and persistent to carry humanity
to the threshold of material abundance, thus providing the material precondi-
tions of socialism. At this level of development it may be plausible that
ecological concerns are weighty relative to further increases in productivity. This argument is similar in principle to Cohen's claim, considered earlier, that socialism is necessary to realise a reduction of toil made possible by productive improvement. To (1) increased output/consumption and (2) reduced toil as tradable benefits of productive improvement, (3) ecological stability is added as a desideratum tradable against (1) and/or (2) (ecological efficiency traded against productive improvement). What links the three is that they are related aspects of the material situation which contributes to human welfare—the level of amenity afforded by use values, the burden incurred in the form of necessary toil, and the ecological conditions in which time devoted to leisure and toil is expended. If it is rational at high levels of consumption to choose reduction of toil in preference to expansion of output (which is why socialism is necessary), then it may be rational where a sufficiency of use values is produced with a tolerably low amount of toil to choose ecological stability in preference to expansion of leisure. In so far as technological development is primarily oriented to ecological efficiency we can designate Ecological Efficiency Socialism. The difficulty with this way of incorporating ecological concerns into the theory of history is that socialism still requires abundance and this is potentially incompatible with ecological goals. Natural limits to productive development may come too early for socialism or, looked at the other way, socialism may come too late for the environment.

The implication of a notion of natural limits for the theory of history, and for socialism, can be seen quite simply by treating this concept as a third variable in the transition equation and making different assumptions about the level of productive development at which natural limits begin to bite. We now have three conceptions of socialism distinguished by the primary orientation to technological development:

(1) Output Expansion Socialism (OES)—technological progress is measured in terms of productive improvement and primarily oriented to output expansion.
(2) Toil Reduction Socialism (TRS)—technological progress is measured in terms of productive improvement and primarily oriented to reduction of toil.
(3) Ecological Efficiency Socialism (EES)—technological progress is measured in terms of ecological efficiency and primarily oriented to protection of the natural environment.

Initially we assume that all three conceptions of socialism have the standard material precondition, i.e. only become possible once abundance has been achieved. Cohen's question concerning the possibility and necessity of socialism now concerns the relation between three variables. It becomes: how do we know that the range of productive force development within which socialism is

A. possible (because the base level, massive surplus, has been attained), and
B. necessary (because capitalist relations of production are fetters on the productive forces), is also within

C. ecological limits?

Some consideration needs to be given to the relationship between B and C for
it is not clear whether C might take the place of B rather than be considered as a distinct point in social development. In Cohen's presentation the point at which capitalism gives way to socialism (B) is determined, given A, by the convergence of the two related tendencies of capitalist development to generate crises of increasing severity and to create a class-conscious proletariat: ‘what is de facto the last depression occurs when there is a downturn in the cycle and ... the proletariat is sufficiently class-conscious and organized.’ But Cohen does not provide a clear account of how crises and class consciousness are related. It appears that they are both effects of capitalist development that therefore go in tandem. It could be that as capitalism develops crises get deeper and the working class becomes more class conscious (but not because crises get deeper). In that case the key variable is the maturing of class consciousness and crisis is merely the circumstance in which revolution occurs. A point will be reached in the independent development of class consciousness at which the proletariat is ready to take the position of ruling class and the overthrow of capitalism will occur during a downturn in the cycle, but it is the mere fact of downturn that is relevant, not its severity. Any downturn will do once the class is ready. But this is not persuasive and a more intimate relationship between crisis and class consciousness should be considered. This is already implied in the idea that a downturn will provide the occasion of social revolution. This is because it is crisis which reveals the incompatibility between the productive forces and the existing economic structure, and deepening crises reveal this incompatibility to be growing. Economic crises thus stimulate awareness of the need for this structure to be ‘burst asunder’ and each time put that structure on trial. The trial goes against capitalism only when class consciousness has matured sufficiently, but that maturation is assisted by the experience of worsening crises. Thus as crises get worse class consciousness matures, and it matures partly because crises get worse. In this account there is a rather close linkage between the rhythm of fettering and the rhythm of class formation and this linkage is needed so that when existing relations are fetters they are replaced. The linkage is established by defining fettering in terms of an overriding human interest which it offends so that fettering stimulates the will to transform the economic structure, and as fettering intensifies so does the will. C may be defined similarly as the point at which capitalism gives way to socialism on an ecological interpretation of fettering. Here the point at which capitalism gives way to socialism (C) is determined, given A, by the convergence of two related tendencies of capitalist development: its ecological destructiveness and its tendency to create a class-conscious proletariat. In this view ecological fettering, by itself, gives sufficient reason to abolish the existing relations of production: it is the ecological crisis which reveals the growing incompatibility between these relations and productive development and assists the development of class consciousness. This argument would make use of the suggestion given above that it may be rational to choose ecological stability in preference to reduction of toil/expansion of output (therefore ecological efficiency to productive improvement). Again, as fettering intensifies so does the will to transform the economic structure. These two accounts are similar in construction—they differ in their notion of the overriding human interest (productive improvement or ecological stability), and this difference stems from a different characterization of what is pertinent in the situation.
which men confront (scarcity or ecological crisis). Apart from considerations of
the strength of the interests invoked, each account is weak in failing to provide
a plausible (or any) account of the development of class capacity.\textsuperscript{59} The theory
requires a plausible linkage between the growing incompatibility, on either
reading, of existing relations with productive development (and hence the need
for and interest in their replacement) and the capacity of the working class
actually to bring about this change. Once it is recognized that fettering does not
by itself create this capacity (though it may contribute to it) then B and/or C
should be augmented by: D the development of class capacity for bringing
about the transformation of economic structure required by B/C. Leaving aside
the question of capacity (assuming, naively, that it develops along with the
interest, along with the fettering) the relationship between B and C must be
seen as a question of the tempo at which each form of incompatibility develops,
supposing each to be potentially important.\textsuperscript{60} In Marx's theory of history the
absence of C has been based upon the expectation that capitalism would act as
a fetter on productive improvement and this would be sufficient reason for this
system to give way to socialism before ecological fettering came on the horizon.
Today, the concept of ecological fettering has become more interesting in so far
as natural limits appear to bite before the social limits which are central to
Marx's theory. Ecological fettering may, then, give sufficient reason for abolishing
capitalism in place of the more distant fettering of productive improve-
ment.

In the old-fashioned version of the theory of history, only two variables are
considered, A and B, and the required sequence is A-B. Now we can see the
implications for the theory of introducing C into the equation. The key question
seems to be the relation between C and A—assuming capitalism develops the
forces far enough, is abundance compatible with ecological stability? And is
further development so compatible? But the relation between C and B is also of
interest. Three sequences will be considered: A–B–C, A–C–B, and C–A–B.

A–B–C

This is the orthodox sequence: socialism would only be feasible if the base level
of development is below the point at which ecological limits bite. For socialism
to be likely, fettering—manifest in deepening crises—would also have to occur
before this point so as to stimulate transition. (A and B must come before C.)
On these assumptions capitalism gives way to socialism before ecological limits
bite. In other words 'knowing and correctly applying' nature's laws unlocks
more than sufficient material wealth to pass the threshold of massive surplus
and allow the developmental tendencies of capitalism (deepening crises and
growing class consciousness/capacity) to create the conditions in which the
transition to socialism occurs. It may be doubted whether Marx recognized any
ultimate natural limits on productive development,\textsuperscript{61} but today there must be
a question mark against the scope for future development of the forces of
production under socialism—ecological limits would bite at some point. In so
far as ecological threats arise very largely from the growth of output and
consumption, OES would exacerbate the problem, especially since it is as-
sumed that the superiority of socialism over capitalism in this case is manifest
in a higher rate of productive improvement. Unless ecological hazards are
assumed, perversely, to be distant it is clear that there is very little mileage in this conception of socialism. TRS would tend to mitigate ecological threats because in this conception 'the promise of abundance is not an endless flow of goods but a sufficiency produced with a minimum of unpleasant exertion' and the primary goal of productive improvement is reduction of that exertion. Indeed, it is arguable that capitalism, in its pursuit of exchange-value, tends to over-produce use-values (to produce superfluous products) and therefore less will be produced and consumed once use-value is the aim of production.

There may be scope for productive improvement in the service of reduced toil via reorganization of work, elimination of unnecessary tasks (e.g. administrative and managerial), improvement of skills and similar measures, but technological progress measured in terms of productivity, and therefore less reliance on labour power, must imply greater reliance on natural resources (energy inputs, mechanization). The need to conserve and protect natural resources, to ensure sustainable production, would, sooner or later, present a barrier to the aspiration to minimize toil and maximize leisure. The simple conclusion is that productive improvement, as the measure of technological progress, will ultimately come up against natural limits in either OES or TRS. Both imply greater recourse to natural resources in the form of raw materials and/or instruments of labour.

A–C–B

In this sequence, socialism is possible (the base level of productive development—massive surplus—is attained) but ecological concerns become pressing before capitalist development has had time to generate incompatibility between forces and relations sufficiently large, and class consciousness/capacity sufficiently advanced to stimulate its replacement by socialism. In other words, the ecological destructiveness of the development of productive forces in capitalism results in ecological fettering before it gets the chance to create the kind of revolutionary situation envisaged in the classical theory. (Of course, this does not mean that deepening crises and growing class consciousness as traditionally conceived play no part in stimulating the will to overthrow capitalism, only that these tendencies are not fully played out as classically envisaged). In this scenario, the transition to socialism will not occur, except on the assumption that ecological fettering (or a combination of ecological and conventional fettering) gives sufficient reason to replace the existing relations of production. In which case it will be EES: technological progress will be measured in terms of ecological efficiency and primarily oriented to protection of the natural environment. By the same token, opportunities for productive improvement in the service of reduction of toil will be circumscribed in so far as these imply greater demands on naturally given resources. A–C–B thus implies substantial revision of the theory of history.

The aspirations of productive improvement and ecological efficiency might be more compatible if the ecological crisis is construed not in terms of the level so much as the direction or form of development of the productive forces. In that case, natural limits might bear principally upon certain types of output and ways of producing rather than the level of productivity and output as such. We could go on developing the productive forces but along a different
Marxism, ‘manufactured uncertainty’ and the ecological crisis

path. Socialism would be necessary as a superior framework for delineating such a sustainable path and, for this reason, be superior to capitalism at developing the productive forces from the level attained under capitalism. This would reconcile productive development and environmental protection since the defect of capitalism would be that it promotes development in the wrong direction and the advantage of socialism would be to promote development in the right (sustainable) direction. In that case it might be contended that productive improvement is still the prime motive for replacing capitalism with socialism on the grounds of sustainable development being a means to that end. On this account, capitalism fetters the productive forces in two ways: in being prone to recurrent (and intensifying) economic crises; and in threatening and being threatened by ecological hazards which both call into question the benefits of growth and begin to limit that growth. Socialism is a superior form of development of the forces of production because it does away with economic crises and embarks on a path of sustainable development, and it is because it is superior in this way that it is selected. This view may be tenable on certain premises. In particular, it depends on the claim that socialism is ecologically superior to capitalism in terms of promoting sustainable development, and that sustainable development facilitates higher levels of productivity. In the short term there probably is a trade-off between productivity growth and sustainability, but in the longer term it might be that sustainable growth is the best achievable. If socialism is both ecologically and (in consequence of this) productively superior to capitalism then the central claims of the theory of history would remain intact. This would still depend, though, on capitalism achieving a massive surplus (abundance) and this level of productive development being sustainable.

C-A-B

If ecological limits to development are reached before the base level for socialism then the theory of history cannot be true because socialism is unattainable (because lacking the required material conditions), or, at least, attempts to build socialism driven by the fundamental human interest in reducing scarcity would result in ecological disaster. Capitalism stalls in its historical task to carry humanity to the threshold of abundance because natural limits to productive development are reached short of this goal. Faced with this scenario socialists would have to rethink the feasibility of socialism in a situation of enduring scarcity. If socialism requires abundance as a good in itself because of the massive improvement of living standards and reduction of toil which it permits, then it might be possible to accept some scaling down of this ambition and relegation of this goal compatible with ecological stability without doing too much damage to socialism because other values (community, equality) will still be intact. The more difficult question for socialism arises if abundance is principally a means to achieve other values, such as equality and classlessness. The question then is whether constraining the growth aspiration of socialism compatibly with ecological goals would jeopardize the more basic aspiration to end class divisions and conflicts over distribution.
Applying the concepts

The difficulty in applying Marx's theory of history to understand the world we live in today is its highly schematic nature and the loose definitions of its central terms. This comment equally applies to the concept of ecological fettering or natural limits. Have the productive forces been developed to the point of abundance in the advanced capitalist societies? Have we, that is, entered the period in which socialism is an objective possibility in the sense that its material preconditions are satisfied? If we follow Cohen's definition this entails two things: the production of a 'sufficiency' of goods with a 'minimum' of toil.67 In similar, but perhaps more frugal, vein Soper refers to 'the necessities of a decent and modest life-style.'68 If we are talking in these terms there seems no doubt that the advanced capitalist societies have met and exceeded the stipulated standard of output/consumption (at least for the bulk of their populations), though not, of course, the required standard of minimum work effort. Cohen says that American capitalism, at least, is a clear case of the system operating to the detriment of human welfare because it prevents the reduction of toil which rationality demands given that consumption is very high and the working day is substantial.69 Such reduction would be a primary purpose and justification of socialism. We can infer that such reduction can, in some measure, be traded against a loss of output given the claim that the capitalist orientation to exchange-value results in over-production of use-values (advanced capitalism produces rather more than a 'sufficiency' of goods). It might be argued that this case can be extended to other comparable capitalist economies. But if we accept that there is real scope, at current levels of productive force, to reduce toil this does not answer the question whether such reduction will be sufficient to realize the minimum effort that abundance demands. Or, if not, how much more productive power is needed to bring this goal within reach. In other words, political relevance demands concreteness. Perhaps more serious is the possibility that abundance defies objective definition at all because of the very powerful cultural shaping of notions of sufficiency or a decent life-style. The very consumerist mentality which capitalism engenders continually pushes outwards the boundary of sufficiency or abundance—70—the destination is continually moving further away and therefore continues to fuel struggles and conflicts over distribution. If there is a question whether abundance has been achieved in the west it seems clear enough that we are not approaching A at a global level.

B similarly defies clear definition and empirical reference. We can observe (if they occur) the deepening crises as capitalism develops and the growing class consciousness. But we cannot tell when we will reach that point, assuming we havenot done so already, at which the proletariat is sufficiently class conscious and organized to replace the existing relations of production. In fact the only confirming evidence of B would seem to be the actual occurrence of the transition, and even then we would have to wait a while (how long?) to be sure that the transition was not premature and therefore that it was not B after all! Contrariwise, the absence of a transition cannot be firm evidence that B has not yet been reached since it might be possible that the birth of new relations of production was abortive. In sum, the expectation/prediction that
Marxism, ‘manufactured uncertainty’ and the ecological crisis 239

capitalist development will eventuate in B is ‘essentially vacuous empirically, since it is consistent with any actual historical events at all’. That there are, ultimately, natural limits to productive development which constitute ‘non-manipulable contextual conditions’ seems evident enough. It is obviously the case that green politics has moved ‘centre stage’, and this has occurred because of a, probably true, perception that current levels and patterns of economic activity are the source of high-consequence ecological threats. But even here we do not really know, as Giddens’ concept of manufactured uncertainty reveals, the true scale of these threats or their origin, and in so far as industrialism is firmly implicated we do not know how far it is the level of economic activity per se that is at stake or the pattern of development. There might be large scope for continued productive improvement within an ecologically sustainable form of development. We might be at or near C, or it could be some way off.

The situation we face today, in terms of the analysis just given, could be that capitalism has driven productive development beyond the base level for socialism and to the point of coming into conflict with ecological limits. It might be that this ecological fettering has occurred before the mechanism of deepening crises and growing class consciousness has had time to come into operation (C before B) or, perhaps, it might be that the conditions for B did mature earlier on but did not produce a successful transition and have since decayed (B was before C but the moment passed). If so, Marx’s error lay in overestimating the tendency of capitalist relations of production to fetter the productive forces through recurrent crises and for this and the associated process of class formation to stimulate transition, and in underestimating the capacity of capitalism for further productive development. Alternatively, it might be that ecological limits have been reached before abundance (C before A). In this case, Marx’s error lay in underestimating the level of productive development required for abundance through underestimating the elasticity (through cultural conditioning) of this concept and capitalism’s potential to continually expand wants and needs.

The second interpretation seems more plausible. It may be true that scarcity has been conquered in the advanced capitalist societies (even if the consumerist ethos militates against general recognition of this truth) but there must be severe doubt as to whether Western levels of productive development, or anything like them (even supposing some reduction of output in favour of reduced toil), could be generalized on a global scale. This means that socialism, in contrast to the vision offered by the theory of history, must come to terms with scarcity as an enduring feature of the human condition. For, as Giddens remarks, that vision of abundance ‘offers no purchase at all on a global situation where the conservation of resources, rather than their unlimited development, is what is called for’. It follows that socialism must now have ecological concerns at its heart, that it ‘can only hope to remain a radical and benign pressure for social change by assuming an ecological dimension’. Soper may be right to argue that the ecological concern also needs socialism if it is to be effective, but socialism must be altered in the process. In particular, ecological concerns need to be incorporated in the catalogue of socialist values, and in the vision of a socialist form of economic life. The transcendence of the ecologically destructive tendencies of capitalism shows only that socialism
makes possible, but does not show that it ensures, ecological stability. Such stability might not be incompatible with further productive improvement and does not, in Soper's view, entail an end to the aspiration to master nature: 'an ecological and socialist corrective to the depredations of the “bourgeois form” of wealth production will depend in part on a highly rational, technically sophisticated intervention in natural forces'. In other terms, 'knowing and correctly applying nature's laws'. Thus, in contrast to the 'philosophic conservative' approach espoused by Giddens, advancing knowledge and control remain key to the socialist outlook. Yet this outlook must now involve something like what Benton calls a 'realist emancipatory perspective' which recognizes that there are natural limits which may be 'at least partially available for transformation by human intentional action' (hence the need and scope for rational intervention) but, ultimately, may prove 'genuinely ... invulnerable to human intentionality'. At this point Giddens' philosophic conservatism comes into play. The socialist outlook must also recognize manufactured uncertainty as a chronic feature of controlled intervention in nature which must qualify our view of such intervention as highly rational and technically sophisticated. Giddens' concept reveals that even when capitalist relations of production—with their destructive tendencies—have been replaced, intervention in nature will be fraught with uncertainty.

Notes

3. *Beyond Left and Right*, p. 53.
8. Ibid., p. 179.
13. Also at the expense of the degradation of work. 'Owing to the extensive use of machinery and to division of labour, the work of the proletarians has lost all individual character, and, consequently, all charm for the workman. He becomes an appendage of the machine, and it is only the most simple, most monotonous, and most easily acquired knack, that is required of him', K. Marx and F. Engels, *The Communist Manifesto*, London, 1998 (1888), p. 43.
14. K. Marx, *Capital*, Vol. 1, London, 1954, p. 252. The analogy between overwork and environmental degradation is drawn by Marx in a striking passage: '... the limiting of factory labour was dictated by the same necessity which spread guano over the English fields. The same blind eagerness for plunder that in the one case exhausted the soil, had, in the other, torn up by the roots the living force of the nation', ibid., p. 229.
Marxism, 'manufactured uncertainty' and the ecological crisis 241

15. That is, the greatest possible working time out of the labourer whose labour-power he has purchased. Ibid., p. 224.
16. Ibid.
18. KMTH, p. 304.
19. KMTH, p. 322.
23. Cohen says that the over-production and consumption of use-values is the distinctive contradiction of advanced capitalism: '... the boundless pursuit of consumption goods is a result of a productive process oriented to exchange-values rather than consumption-values' (KMTH, p. 306); 'if the aim of production were use-value, much less use-value would be sought, produced, and consumed than is in fact produced and consumed' (KMTH, p. 303).
27. Ibid., p. 186.
28. Ibid.
30. Alan Carling presents classical Marxism as two intrinsically related branches: a 'theory of society' (including the theory of history) and a 'politics of emancipation', in 'Analytical and Essential Marxism', op. cit.
31. As formulated by Cohen, the 'development thesis' states that 'the productive forces tend to develop throughout history', KMTH, p. 134.
32. KMTH, p. 198.
33. KMTH, p. 41.
34. KMTH, p. 45.
35. KMTH, p. 55.
36. Marx, quoted in KMTH, p. 201.
37. KMTH, p. 206, emphases added.
38. KMTH, p. 198.
40. KMTH, p. 203.
41. KMTH, p. 204.
42. KMTH. Contrary to what is said here, and the actual history of capitalism, Cohen says that, according to the theory, 'once socialism is possible, capitalism ... is no longer stable' (ibid., p. 203). This suggests that severe economic crises only occur in late capitalism, i.e. once the material preconditions of socialism are already in place, and that capitalism is stable in its early stage of development.
43. This view of the prospects for productive development under capitalism in the indefinite future goes against Marx's famous assertion in the Preface to A Contribution to the Critique of Political Economy that 'no social formation ever perishes before all the productive forces for which there is room in it have developed'.
44. It also complies with the dominant 'economic theory' of socialism during this century which saw the superiority of socialism over capitalism in terms of greater economic efficiency and which was so central to the defence of 'really existing socialism'. The central belief was that 'social ownership would be more efficient than private, and a planned economy than the free market', D. Marquand, The New Reckoning, Cambridge, 1997, p. 64.
45. KMTH, p. 201.
46. KMTH, p. 204.
47. KMTH, pp. 302–7.

48. Although the productive forces include not simply instruments of production and raw materials which are derived from nature but also labour power (KMTH, p. 32) and ‘the development of the productive forces is very largely the growth in knowledge of how to control and transform nature’ which is an aspect of labour power (KMTH, p. 41).

49. Quoted in Foster, op. cit., p. 173.

50. KMTH, p. 295.


52. The two can be reconciled if the critique of capitalism is along the lines that it is incapable of rationally applying nature’s laws except under regulation by the state, and this would be consistent with the claim that only a rational economic order, i.e. socialism, would permit the productive improvement without the ecologically destructive tendency.


54. KMTH, p. 15; see Wetherly and Carling, op. cit., pp. 42–50 for criticism of Cohen on this point.

55. KMTH, p. 152.

56. Hughes, op. cit., p. 190.

57. KMTH, p. 204.


60. C could only be seen, a priori, as replacement for B if it is argued that fettering of productive improvement could never give sufficient reason for replacing existing relations of production, and if only ecological fettering could supply such reason.

61. See Benton, op. cit., p. 59.


63. This suggestion is made by Cohen, KMTH, p. 303.

64. KMTH, p. 323.

65. Here socialism is conceived in terms of a necessary ‘partnership’ with nature, but it bears emphasis that this partnership is conceived instrumentally or anthropocentrically rather than eco-centrically. Protection of nature is not for its own sake but in recognition of its contribution to human welfare.

66. This is the traditional Marxist position. The persistence of scarcity implies a continuing conflict over distribution. See KMTH, p. 206.


68. Soper, op. cit., p. 93.

69. KMTH, p. 310.

70. Soper acknowledges that ‘what counts as “primary” or “necessary” consumption ... is not fixed by nature ... [but is] ... culturally conditioned to a very high degree’, op. cit., p. 93.


72. Benton, op. cit., p. 70.

73. Giddens, Beyond Left and Right, p. 101.

74. Soper, op. cit., p. 82.

75. Ibid.

76. Ibid., p. 92.

77. Benton, op. cit., p. 58.

78. Benton refers to a reconciliation with what he terms ‘epistemic conservatism’ which appears close to Giddens’ concept, ibid.