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# *Marxism and Natural Limits: An Ecological Critique and Reconstruction*

Many on the left find a source of hope in the realignment of 'green' and socialist perspectives.* I believe they are right to do so, and I share the hope. But it remains true that important currents within Green politics and culture are hostile to socialism (as they understand it), whilst the response of the socialist left to the rise of ecological politics has, in the main, been deeply ambiguous.[1] In what follows I attempt to do two things: first, to demonstrate that these tensions and oppositions have deep roots in the most influential intellectual tradition on the left, and, second, to provide some new conceptual 'markers' which I hope will play a part in facilitating the growing Red/Green dialogue.[2] Although some participants in this dialogue (rightly, in my view) favour a revaluation of non-Marxian socialist traditions of thought and action,[3] this should not, I think, take the place of a continuing and rigorous exploration of the limits and resources of Marxism itself. As I hope to show, Marxism still has much to offer, and what it has to offer is unique to it. Moreover, where the mainstream of Marxist thinking has been

wrong, or limited, its limitations have been both disastrous and widely shared, so that the effort of critical exposure is doubly worthwhile.

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* I would like to acknowledge the helpful criticisms of earlier drafts of this article by Michael Redclift.

[1] A classic expression of this ambiguity was H.M. Enzensberger's seminal 'Critique of Political Ecology', *New Left Review* 84, March/April 1974, reprinted in Enzensberger, *Dreamers of the Absolute*, London 1988. Five themes recur in the 'traditional' socialist critiques of ecological politics. The first, my focus here, equates the ecological perspective with neo-Malthusianism and rejects it as a 'natural limits' conservatism. The second sees in green politics a generalized and reactionary opposition to industrialism and technology as such, thus deflecting attention from the specifically capitalist character of environmental destruction. The third theme, closely connected with the second, accuses the ecologists of deflecting attention from class and regional *inequalities* in resource use and environmental destruction, in the name of a universal 'human interest' in environmental sustainability. Fourthly, this, like all 'general interest' ideologies in class societies, is a mask for *particular* interests: in this case an alliance of technocrats with affluent rural middle-class activists who share vested interests in ecological scare-mongering, and/or in the defence of a privileged minority life-style. Finally, ecological priorities are sometimes seen as elite preferences, matters of aesthetics or taste, which privileged minorities impose on the rest of a population, many of whom lack fulfilment of their more basic needs. The notion of a *hierarchy* of needs or wants, in which environmental preferences may be acknowledged, but assigned lower priority than more 'basic' needs for shelter, food and security, is deeply ingrained in 'traditional' left responses to environmentalism.

Green hostility or indifference to socialism tends to focus on the disastrous environmental record of the 'actually existing' socialist societies of eastern Europe, and/or the record of the western social democratic parties in governmental office. The Marxist tradition is widely condemned for its 'productivist' values. The 'eco-libertarians' among the West German Greens (see W. Hülsberg, 'The Greens at the Crossroads', *New Left Review* 152, July/August 1984, pp. 24–5, and *The German Greens*, Verso, London 1988, ch. 8) are particularly hostile to the fusion of ecological and socialist perspectives, but there is a more widely diffused tendency for 'green' writers to represent ecological politics as transcending the whole traditional opposition of left and right in politics: 'Both are dedicated to industrial growth, to the expansion of the means of production, to a materialist ethic as the best means of meeting people's needs, and to unimpeded technological development. Both rely on increasing centralization and large-scale bureaucratic control and co-ordination. . . . For an ecologist, the debate between the protagonists of capitalism and communism is about as uplifting as the dialogue between Tweedledum and Tweedledee' (Jonathon Porritt, *Seeing Green*, Oxford 1984, p. 44).

[2] This dialogue has produced a considerable, and rapidly growing literature. In Britain, a highly successful national 'Red and Green' conference was held in London in May 1988, and much useful dialogue takes place in the periodical literature—most especially in *New Ground*, published by the Socialist Environment and Resources Association. The recent book by Martin Ryle, *Ecology and Socialism*, London 1988, includes an excellent survey and development of this literature, arguing persuasively that an ecological perspective is compatible with a wide range of social and political ideologies; the link between socialism and ecology has to be forged, it cannot be taken as 'given' or obvious. Pioneers of this project include B. Commoner (e.g. *The Closing Circle*, New York 1971, and *The Poverty of Power*, London 1976), A. Gorz (e.g. *Ecology as Politics*, London 1980 and *Paths to Paradise*, London 1984) and R. Bahro (e.g. *From Red to Green*, Verso, London 1984, and *Socialism and Survival* and *Building the Green Movement*, London 1986). J.L. Thompson (see 'Preservation of Wilderness and the Good Life', in R. Elliot and A. Gare, eds., *Environmental Philosophy*, Milton Keynes: Open University, 1983) makes out a valuable case for an eco-socialist reading of H. Marcuse. The late Raymond Williams authored an influential pamphlet entitled *Socialism and Ecology* (SERA, no date) and gave considerable attention to ecological issues in his *Towards 2000*, Harmondsworth 1985. Attempts have been made to synthesize ecology with other political perspectives, such as anarchism and feminism. The most widely known of the former are the works of M. Bookchin (see his *Post-Scarcity Anarchism*, London 1971, and

I shall start with the statement of a paradox. Marx and Engels thought of their philosophical positions as naturalist and materialist. They tended to regard modern science as potentially favourable to—even a necessary condition for—human emancipation, they considered their own work to be scientific, and they aligned themselves unequivocally with the naturalistic implications of Darwinism in the evolutionary debates of the 1860s onwards.[4] Numerous statements of the leading 'threads' or 'premises' of their materialist view of history are likewise unequivocally naturalistic. The famous 1859 'Preface' (Marx):

> In the social production of their existence, men inevitably enter into definite social relations which are indispensable and independent of their will, namely relations of production appropriate to a given stage in the development of their material forces of production. . . . The mode of production of material life conditions the general process of the social, political and intellectual life.[5]

The 1875 *Critique of the Gotha Programme* (Marx):

> Labour is *not the source* of all wealth. *Nature* is just as much the source of use values (and it is surely of such that material wealth consists!) as labour, which itself is only the manifestation of a force of nature, human labour power.[6]

The 1845 *German Ideology* (Marx & Engels):

> The first premise of all human history is, of course, the existence of living human individuals. Thus the first fact to be established is the physical organization of these individuals and their consequent relation to the rest of nature. Of course, we cannot here go either into the actual physical nature of man, or into the natural conditions in which man finds himself—geological, oro-hydrographical, climatic and so on. All historical writing must set out from these natural bases and their modification in the course of history through the action of men.[7]

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[2] (*cont.*)
*The Ecology of Freedom*, Palo Alto 1982), whilst the classic work on the latter theme is Carolyn Merchant, *The Death of Nature: Women, Ecology and the Scientific Revolution*, London 1982.

[3] See, for example, Bahro, *From Red to Green*, esp. pp. 218–220 and 235. Raymond Williams, too, draws attention to a distinctively British tradition of environmental criticism of industrial capitalism, some of it explicitly socialist in orientation. See his *Socialism and Ecology* (op. cit.) and *Culture and Society 1780–1950*, Harmondsworth 1961.

[4] There is an extensive literature on the relationship between Marx and Engels and Darwinism. See, for example, G. Stedman Jones, 'Engels and the End of Classical German Philosophy', *New Left Review* 79, May/June 1973; S. Timpanaro, *On Materialism*, NLB, London 1975; V. Gerratana, 'Marx and Darwin', *New Left Review* 82, November/December 1973; T. Benton, 'Natural Science and Cultural Struggle: Engels on Philosophy and the Natural Sciences', in J. Mepham and D.H. Ruben, eds., *Issues In Marxist Philosophy*, vol. 2, Brighton 1979; and P. Heyer, *Nature, Human Nature and Society*, Westport 1982. For a rather more qualified view of the Marx/Darwin relationship, see G. Kitching, *Karl Marx and the Philosophy of Praxis*, London 1988, pp. 61–5.

[5] K. Marx and F. Engels, *Collected Works* (hereafter MECW), Vol. 29, London 1987, p. 263.

[6] K. Marx and F. Engels, *Basic Writings on Politics and Philosphy*, ed. L.S. Feuer, London 1984, p. 153.

[7] MECW, vol. 5, p. 31.

Vol. 1 of *Capital* (1867):

> The labour-process. . . . is human action with a view to the production of use-values, appropriation of natural substances to human requirements; it is the necessary condition for effecting exchange of matter between man and Nature; it is the everlasting Nature-imposed condition of human existence, and therefore independent of every social phase of that existence, or rather, is common to every such phase.[8]

These, and many other passages in the works of Marx and Engels attest to their persistent view of human social life as dependent upon nature-given material conditions. The requirement that humans must interact with their natural environment in order to meet their needs is a transhistorical feature of the human predicament. This position is even to be found, notwithstanding the residual idealism of much in the early works, in the *Economic and Philosophical Manuscripts* of 1844:

> Nature is man's *inorganic body*—nature, that is, in so far as it is not itself human body. Man *lives* on nature—means that nature is his *body*, with which he must remain in continuous interchange if he is not to die. That man's physical and spiritual life is linked to nature means simply that nature is linked to itself, for man is a part of nature.[9]

This naturalistic thesis is complemented by a second—that the key to understanding the geographical *variations* and historical *transformations* in the form of human social and political life is to be found in the various *ways* in which these societies interact with nature:

> The way in which men produce their means of subsistence depends first of all on the nature of the actual means of subsistence they find in existence and have to reproduce. This mode of production must not be considered simply as being the production of the physical existence of the individuals. Rather, it is a definite form of activity of these individuals—a definite form of expressing their life, a definite *mode of life* on their part.[10]

If these are, indeed, central doctrines of historical materialism, then this is our paradox: ecology, considered strictly as one of the modern life-sciences, is the systematic study of the interrelations between populations of animals or plants and their organic and inorganic surroundings. Historical materialism presents itself precisely as an approach to the study of human societies in this perspective—as, in other words, ecology applied to *human* populations. Historical materialism, without distortion, could now be represented as a specific field within ecology: the ecology of the human species. Of course, this bold statement is open to a reductionist misreading. Compared with other animal species, humans are exceptionally adaptable vis-à-vis their environmental conditions of existence, and also possess the capacity for a generation-by-generation cumulative augmentation of their transformative powers. These and other features define the *particularities* of human ecology, and also determine the enormous causal

[8] *Capital*, Vol. 1, London 1961, pp. 183–4.
[9] MECW vol. 3, p. 276.
[10] MECW vol. 5, p. 31.

importance of human environmental impacts on the ecology of other species. It is not my intention to deny any of this particularity of the human case. Although ecology *is* a generalizing science like any other, it deploys its general concepts in the analysis of the particularities in the environmental interactions of each species within its purview. This includes the human species no more, and no less, than the others.

If the point is taken, that the basic ideas of historical materialism can without distortion be regarded as a proposal for an ecological approach to the understanding of human nature and history, then why so much bad blood between Marxists and ecologists? Why have so many in the Marxist tradition been either hostile or equivocal in response to the rise of environmental politics in general, and, more specifically, to the challenge of the Greens? Why, indeed, have the Marxists themselves not taken the *lead* in providing strategically relevant analyses of the relations betwen environmental crises and the imperatives of capitalist 'development'? Of course, Green politics are about more than environmental issues, and there are many sites of tension between their perspectives and styles of activity and those of the class-based 'traditional' left. However, I think that differences between these broad cultural–political traditions on the questions of appropriate and sustainable forms of human social interaction with the material environment are at the core of their mutual suspicion. To achieve an understanding of one major source of these differences in the conceptual formation and development of Marxism will be the purpose of much of my argument here.

My central argument is that there is a crucial hiatus between Marx's and Engels's materialist premisses in philosophy and the theory of history, on the one hand, and some of the basic concepts of their economic theory, on the other. (The 'hiatus' to which I refer is internal to the 'mature' writings, and not to be confused with the much-discussed chronological 'break' between the earlier and later Marx—note the wide spread of dates of the above 'materialist' quotations.) These basic economic concepts mark a significant *retreat* from the thoroughgoing materialism encapsulated in the quotations with which I began. This hiatus deprives historical-materialist economic thought of the conceptual means to recognize and explain ecological crises, and so of a key element in any fully rounded critique of capitalist production. This defect in Marx's economic thought is not, I shall argue, peculiar to him. It derives, rather, from an insufficiently radical critique of the leading exponents of Classical Political Economy, with whom he shared and from whom he derived the concepts and assumptions in question.[11] It is plausible to see this failure as in part due to a mystificatory feature of capitalist economic life itself, but it is also connected with a general, politically understandable, reluctance on the part of Marx and Engels to recognize nature-imposed limits to human

[11] A brief but very valuable comment on political economy and Marx's relation to it, consonant with the present argument, is given in Ch. 1 of Michael Redclift, *Development and the Environmental Crisis*, London 1984. The argument is taken further in Redclift, *Sustainable Development*, London 1987—especially chapter 3. See also the very useful discussion in T. O'Riordan, *Environmentalism*, London 1981, Ch. 2.

potential in general, and to the creation of wealth in particular. The terms of the Marxian critique of Malthus can be seen as quite central to this theoretical trajectory.

## 1. Epistemic Conservatism and Emancipatory Critiques

Modern environmentalisms frequently evoke the spectre of 'Malthusianism' and, in doing so, call forth determinedly social-constructionist responses.[12] This broad pattern of 'natural limits' arguments in conflict with social-constructionisms is, of course, familiar from other areas of debate. It will be worth digressing very briefly to look at some of its general features before returning to the special case of the conflict between Marxism and Malthusianism. One well-known early critique of sociobiology as a form of biological determinism concludes: ' . . . determinists assert that the possibility of change in social institutions is limited by the biological constraints on individuals. But we know of no relevant constraints placed on social processes by human biology. There is no evidence from ethnography, archaeology, or history that would enable us to circumscribe the limits of possible human social organizations. What history and ethnography do provide us with are the materials for building a theory that will itself be an instrument of social change.'[13]

Similar oppositions have been widespread in sociology, as between proponents of functionalist or structuralist positions, and those who have advocated individualist, voluntaristic, agent-centred alternatives. In psychoanalysis, Freud's well-known invocation of the unavoidable sources of human suffering is exemplary: 'We are threatened with suffering from three directions: from our own body, which is doomed to decay and dissolution and which cannot even do without pain and anxiety as warning signals; from the external world, which may rage against us with overwhelming and merciless forces of destruction; and finally from our relations to other men. The suffering which comes from the last source is perhaps more painful to us than any other. We tend to regard it as a kind of gratuitous addition,

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[12] Among modern 'neo-Malthusians', the Ehrlichs are perhaps the best known: P.R. Ehrlich, *The Population Bomb*, New York 1968; P.R. and A.H. Ehrlich, *Population, Resources, Environment: Issues in Human Ecology*, San Francisco 1970; and P.R. and A.H. Ehrlich and J.P. Holdren, *Human Ecology*, San Francisco 1973. Garrett Hardin's 'Tragedy of the Commons' (in J. Barr, ed., *The Environmental Handbook*, London 1971) and 'Lifeboat Ethics: The Case against Helping the Poor' (in W.H. Aiken and H. La Follette, *World Hunger and Moral Obligation*, New Jersey 1977) bring out very clearly some political implications of modern neo-Malthusianism. The seminal Club of Rome study *The Limits to Growth* (Meadows et al., London 1972) is also considered by some to be 'neo-Malthusian', presumably because of its emphasis on natural limits and its reliance on the idea of exponential growth. It does not, however, focus on population as the key issue ('The team examined the five basic factors that determine, and therefore, ultimately limit, growth on this planet—population, agricultural production, natural resources, industrial production, and pollution', pp. 11–12). A useful recent discussion of neo-Malthusianism in relation to world poverty and famine is O. O'Neill, *Faces of Hunger*, London 1986.

[13] Sociobiology Study Group of Science for the People, in A.L. Caplan, ed., *The Sociobiology Debate*, New York 1978, pp. 289–90.

although it cannot be any less fatefully inevitable than the suffering which comes from elsewhere.'[14]

In view of this widespread pattern of argument, it is useful to distinguish two strains of conservatism: evaluative and epistemic. The former directly advocates patriarchy, inequality, discipline, continuity or whatever as intrinsically desirable, as constitutive of the good life. By contrast, what I call 'epistemic' conservatism may well share, or affect to share, the egalitarian, communitarian or emancipatory value-orientations of the radical. Conservative conclusions are drawn, however reluctantly, from what are held to be unalterable features of the human predicament: from our inner natures, from external nature, or from a combination of the two. Hobbes, Malthus, the later Freud, Durkheim and many others are open to interpretation as epistemic conservatives in this sense.

Epistemic conservatisms have provided the most challenging objections to emancipatory projects and it is arguable that most radical theories are shaped in important ways by the strategic requirement that they avoid these objections. There is, indeed, a deeper affinity between emancipatory thought and epistemic conservatism. Both perspectives recognize a conflict between persistent, deep-rooted human aspirations on the one hand, and structures of internal and/or external constraint on the other. This is a necessary moment in any emancipatory perspective if it is effectively to *indict* the existing order. Where emancipatory thought parts company with epistemic conservatism is in its insistence that the structures of constraint which frustrate human potential are neither universal nor necessary: there are reasonable grounds for hope.

It is important for my subsequent argument to distinguish two alternative directions of emancipatory response to epistemic conservatism. The first, which I will call Utopian, explicitly or implicitly denies the independent reality of the sources of constraint identified by the epistemic conservative. These oppressive structures of existence take on the *appearance* of independence, and can oppress us only insofar as we take the appearance for reality. Lukács's argument in 'Reification and the Consciousness of the Proletariat'[15] is often read in this way, and the general intellectual strategy has had wide currency in humanist sociologies. A Utopian rejection of biological limits to human social possibilities has been widespread among opponents of biological determinisms, and psychoanalysis, too, is susceptible of readings in which unconscious determinants of conscious life are thought of as susceptible of reintegration within the autonomous ego.[16]

To be contrasted with Utopian emancipatory perspectives are Realist

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[14] 'Civilization and its Discontents', in S. Freud, *Civilisation, Society and Religion*, Harmondsworth 1985, p. 264.
[15] In G. Lukács, *History and Class Consciousness*, London 1971.
[16] See, for example, Russell Keat's telling critique of Habermas's use of psychoanalysis in *The Politics of Social Theory: Habermas, Freud and the Critique of Positivism*, Oxford 1981, Ch. 4. See also Barry Richards, 'The Eupsychian Impulse: Psychoanalysis and Left Politics since '68', *Radical Philosophy* 48, Spring 1988.

ones which assert or recognize the purpose-independent reality of the structures, forces or mechanisms which limit human aspirations.[17] The hope of emancipation is sustained by an account of these sources of constraint which renders them *at least partially* available for transformation by human intentional action. To be 'real', even to be 'natural', is not necessarily to be unchangeable! But what a Realist emancipatory perspective carries with it is a commitment to viewing transformative action in the context of its real, purpose-independent conditions of possibility, and its associated limits of effectiveness, its liability to be frustrated by unforeseen consequences, and so on. At the limit, a Realist emancipatory perspective must be open to the empirical possibility of a reconciliation with epistemic conservatism —in the face of realities which genuinely are invulnerable to human intentionality, adaptation by modifying or even abandoning our initial aspirations is itself to be recognized as a form of emancipation.

## 2. Marx and Engels Against Malthus

To return, now, to my central theme, my argument is that the economic thought of Marx and Engels includes important elements of a Utopian over-reaction to Malthusian epistemic conservatism. The overall position of Marx and Engels is an unstable and contradictory compromise between Realist and Utopian elements.

The broad features of the controversy over Malthus's 'law of population' are well known and I shall not rehearse them in detail.[18] As a true epistemic conservative, Malthus claimed to share his opponents' enthusiasm for a new and just order of society: 'I have read some of the speculations on the perfectibility of man and of society with great pleasure. I have been warmed and delighted with the enchanting picture which they hold forth. I ardently wish for such improvements. But I see great, and, to my understanding, unconquerable difficulties in the way to them.'[19] Foremost among the 'speculations' of which

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[17] The approach developed here has close affinities with the work of Russell Keat and John Urry, Roy Bhaskar, Sue Clegg, Andrew Sayer, John Lovering, Andrew Collier, William Outhwaite, Anne Witz and others. I have been greatly helped in working out this argument by reading their works, and by personal conversations. I am especially indebted to the participants in the first 'Reds and Greens' Conference, 14–15 May 1988, the annual conferences on 'Realism and the Human Sciences', and the *Radical Philosophy* day conference on 'Reason, Hope and Revolution', 5 November 1988 for helpful criticism of these ideas. The form of realism here advocated has been furthest developed by Roy Bhaskar, most especially in his books *A Realist Theory of Science*, 2nd Ed., Brighton 1978; *The Possibility of Naturalism*, Brighton 1979; and *Scientific Realism and Human Emancipation*, Verso, London 1986. For my purposes here, Bhaskar's position involves concessions to anti-naturalism which undermine its great usefulness in other respects. See T. Benton, 'Realism and Social Science', *Radical Philosophy* 27, Spring 1981, reprinted in Edgley & Osborne, eds., *Radical Philosophy Reader*, Verso, 1985. My approach here contrasts significantly with the 'transformational model of social activity' developed by Bhaskar, especially in Chapter 4 of *Scientific Realism and Human Emancipation*, though I do not engage with his position here. I have also benefited greatly from conversations with Olga Ojeda on these and related issues.

[18] A very useful commentary, which focuses on the responses of Malthus's contemporaries, is K. smith, *The Malthusian Controversy*, London 1951.

[19] T.R. Malthus, *An Essay on the Principle of Population*, ed. A.G.N. Flew, Harmondsworth 1970, p. 69.

Malthus spoke in his first *Essay* were, of course, the egalitarian and communitarian proposals of Godwin and Condorcet in the years following the French Revolution. The 'unconquerable difficulties' reduced to the elementary matter of a necessarily adverse relationship between the tendency of population to rise geometrically and that of food-supply to rise at best only arithmetically. This inescapable feature of the human condition was sufficient to lay waste to all and any of the grand visions of an abundant egalitarian and cooperative commonwealth. The misery and poverty arising from the pressure of population upon the supply of means of subsistence must *necessarily* affect a large part of human kind notwithstanding the best intentions of would-be reformers.

Marx and Engels were fiercely critical of Malthus's 'law' and there are numerous references to it throughout their work.[20] Polemics aside, their critique was double-pronged: first, a series of arguments against the universality and necessity of the law, and, second, a reconceptualization and explanation of the phenomenon—a relative surplus population—which Malthus had addressed, as an effect not of the human predicament, but of the dynamics of capitalist accumulation. In his (1844) 'Outlines of a Critique of Political Economy' Engels argued that it was 'absurd to talk of over-population' when no more than one third of the earth's surface was cultivated, and an application of 'improvements already known' could raise the production of this third sixfold.[21] Moreover, the geometrical rise in population was matched by a geometrical ratio in the advancement of science and, by implication, in its application in agricultural production: 'And what is impossible to science?' As to the geometrical ratio of population itself, Engels made use of Malthus's recognition of the role of 'moral restraint' (which was emphasized in later versions of the *Essay*): 'We derive from it [the Malthusian theory] the most powerful economic arguments for a social transformation. For even if Malthus were completely right, this transformation would have to be undertaken straight away; for only this transformation, only the education of the masses which it provides, makes possible that moral restraint of the propagative instinct which Malthus himself presents as the most effective and easiest remedy for over-population.'[22]

What these arguments leave rather unclear is whether Marx and Engels did recognize any ultimate natural limits to population, or to human transformative powers vis-à-vis nature. In a very useful discussion of this issue, K.J. Walker has argued that Marx and Engels did, in fact, admit the possibility of such outer limits.[23] This would,

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[20] These are collected in R.L. Meek, ed., *Marx and Engels on the Population Bomb*, Berkeley 1971—essentially a newly titled reprint of Meek, ed., *Marx and Engels on Malthus* (1951), with a foreword by S. Weissman situating the text in relation to the neo-Malthusian challenge of P.R. Ehrlich's best-seller, *The Population Bomb*.

[21] MECW vol. 3, p. 440.

[22] Ibid., p. 439.

[23] K.J. Walker, 'Ecological Limits and Marxian Thought', *Politics* XIV (1) May 1979, p. 34.

indeed, be consistent with the central premisses of historical materialism. However, the emphasis of their arguments, understandable enough, was that such limits, if they existed, were very far from having been reached at that time, and were certainly not responsible for the prevailing poverty and misery. At most, Marx and Engels recognized 'the abstract possibility' that limits would have to be set to the human population, but this was so distant as to be, for current practical purposes, irrelevant. Indeed, in a passage just prior to that quoted above, Engels goes so far as to say: 'Thanks to this theory, as to economics as a whole, our attention has been drawn to the productive power of the earth and of mankind; and after overcoming this economic despair we have been made *for ever secure against the fear of overpopulation*.'[24]

The Malthusian 'law' is not, then, to be accepted as a universal law of nature, but this is not to deny the actuality of the phenomena which the 'law' is intended to explain. Like all economic laws, Malthus's is associated with determinate social conditions. Each stage of historical development has its own law of population, and what is valid in the Malthusian population doctrine is restricted to its status as a characterization of the necessity of what Marx and Engels variously call a 'reserve army of labour' or 'relative surplus population' to specifically capitalist accumulation. Correctly formulated, the law referred to the excessive numbers of wage labourers in relation to the means of *employment* (not, directly at least, *subsistence*), and the explanation given to the phenomenon in *Capital* is that it results from the long-run tendency of variable capital to decrease as a proportion of total capital employed.[25]

This dual strategy against Malthus—denial of *naturally* imposed limits, but recognition of historically transitory *socially* imposed limits—has clear political consequences. It is equally apparent that the stand taken against Malthus is intimately bound up with Marx's and Engels's perceptions of these political consequences: 'But if this theory is correct, then again I can*not* abolish the law even if I abolish wage labour a hundred times over, because the law then governs not only the system of wage labour but *every* social system. Basing themselves directly on this, the economists have been proving for fifty years and more that socialism cannot abolish poverty, *which has its basis in nature*, but can only make it *general*, distribute it simultaneously over the whole surface of society!'[26] For political reasons, then, Marx and Engels were strongly, and understandably, predisposed against 'natural-limits' arguments, and they rightly saw the Malthusian population doctrine as such a 'natural-limits' argument.

### 3. Natural Limits in Ricardo's Political Economy

On this question Marx and Engels were on the same side as Ricardo.

[24] MECW vol. 3, p. 439, emphasis added.
[25] *Capital* Vol. 1, p. 628.
[26] From Marx's *Critique of the Gotha Programme*, in Feuer, ed., op. cit., p. 165.

Though the latter incorporated a qualified form of Malthus's law into his political economy, he was a determined critic of Malthus on a range of other issues. The most relevant of these to our concerns were Malthus's theory of rent and his notion of 'unproductive consumption'. On the vexed question of rent, Malthus argued that it did not derive from monopoly ownership by the landlords, but was rather a result of that special 'quality of the earth by which it can be made to yield a greater portion of the necessaries of life than is required for the maintenance of the persons employed on the land'.[27] Ricardo's view was that 'rent . . . is a creation of value, but not a creation of wealth'[28]: it is 'nothing more than a revenue transferred from one class to another'.[29] A second bone of contention was Malthus's view that current economic problems could be attributed to over-rapid capital accumulation, outstripping the growth of purchasing power. Since this tendency was inherent to capitalism, there was a permanent requirement for a class of unproductive consumers to sustain effective demand. Both arguments were recognized by Ricardo to be apologetics on behalf of the landlord class, whose interests were antagonistic to those 'of every other class in the community'.[30] In particular, the rent on land and landlord's consumption was seen as an unnecessary limit on the accumulation of capital: 'for the country would have a greater disposable fund if its land were of a better quality, and it could employ the same capital without generating a rent'.[31]

Ricardo, like Marx and Engels, was reluctant to admit any important role for nature-imposed limits. As we shall see, in several important respects Marx and Engels simply took over and developed those elements of his political economy in which this position was most clearly expressed. Let us take first what Ricardo has to say in the chapters of his *Principles of Political Economy and Taxation* which deal, respectively, with value, rent and capital accumulation. Ricardo follows Adam Smith in distinguishing 'value in use' from 'exchangeable value'. Exchangeable value, he says, has two sources: relative scarcity of the goods concerned, and the labour, or trouble of acquiring them. He recognizes that, for a small class of goods, scarcity as such directly affects their value, independently of the amount of labour expended in acquiring them: their supply is subject to absolute (qualitative or quantitative) limits, not alterable by any amount of human effort. But Ricardo is quite explicit that this applies to a small minority of goods only, and that for the great majority of commodities in circulation, exchangeable value expresses the quantity of labour expended in their 'acquisition' (or production). He is equally clear that the economic concepts and laws he is about to expound apply *only* to this large class of commodities: 'In speaking then of commodities, of their exchangeable value, and of the laws which regulate their relative prices, we

[27] Malthus, as quoted in D. Ricardo, *On the Principles of Political Economy and Taxation*, ed. R.M. Hartwell, Harmondsworth 1971, p. 393.
[28] Ricardo, in ibid., p. 392.
[29] Buchanan, quoted approvingly in Ricardo, ibid., p. 391.
[30] Ricardo quote in Meek (op. cit.), p. 13, to which this account of the Ricardo/Malthus relationship is considerably indebted.
[31] Ricardo, op. cit., p. 392.

mean always such commodities only as can be increased in quantity by the exertion of human industry, and on the production of which competition operates without restraint.'[32] Natural scarcity of a resource, therefore, is excluded from the purview of economic analysis except when and insofar as it is manifested in the form of an extra expenditure of the labour of acquiring it.

When Ricardo comes to discuss the source of rent, he poses the question why it is possible to charge rent on land, but not on other gifts of nature such as air, water, the pressure of the atmosphere, and so on, which are likewise involved in the creation of wealth. The answer is to be found in the fact that these 'free' elements in production exist in boundless quantity and are therefore not susceptible to private appropriation: 'With a given quantity of materials, and with the assistance of the pressure of the atmosphere, and the elasticity of steam, engines may perform work, and abridge human labour to a very great extent; but no charge is made for the use of these natural aids, because they are inexhaustible, and at every man's disposal. In the same manner the brewer, the distiller, the dyer, make incessant use of the air and water for the production of their commodities; but as the supply is boundless, they bear no price.'[33] These naturally given material conditions of production do not enter into the costs of production, nor can they impose natural limits on production. Ricardo treats rent on mines, like rent on land, as a revenue accruing from private appropriation, not from value created by the landlord. In mining for metals, as in agriculture, exchangeable value depends on labour-time only. Scarcity as such does not enter into economic calculation: its effect on exchange-value is solely by way of its impact on the labour necessary for its extraction.

Our final illustration comes from Ricardo's chapter on the 'Effects of Accumulation'. Here he considers another possible source of limits to the accumulation of capital, this time imposed by our internal natures: the possibility that there might be natural limits to the *demand* for commodities, with consequent 'glut' and a fall in the rate of profit on investments. Ricardo follows Smith in his treatment of this problem: 'Adam Smith has justly observed "that the desire of food is limited in every man by the narrow capacity of the human stomach, but the desire of the conveniences and ornaments of building, dress, equipage, and household furniture, seems to have no limit or certain boundary." Nature then has limited the amount of capital which can at any one time be profitably engaged in agriculture, but she has placed no limits to the amount of capital that may be employed in procuring "the conveniences and ornaments" of life.'[34] With respect to demand, then, Ricardo explicitly makes the freedom of capital accumulation from natural limits dependent upon an assumption about human nature: limits to our appetite for food are compensated by limitless desires for 'ornaments and conveniences' of life.

[32] Ibid., p. 56.
[33] Ibid., p. 93.
[34] Ibid., p. 294.

Ricardo sometimes speaks of this limitlessness of desire as 'occasioned by production' and sometimes as something 'implanted in every man's breast'.[35] Either way, he does not see the assumption as problematic.

Ricardo does, however, recognize a potential limit to accumulation in the possibility that wages might, in the long run, rise in relation to profits to the point where the motive for investment would cease. Under what conditions might there be such a long-run rise in wages? Only, Ricardo argues, as a consequence of a similarly long-run decline in the 'facility of producing the food and necessaries of the labourer'.[36] In this respect, then, Ricardo does recognize a possible natural limit to accumulation—a concession to Malthus's population doctrine, if not to the latter's views on rent and unproductive consumption.

In conclusion, then, we can say that Ricardo's political economy recognizes several classes of nature-given preconditions for the conduct and expansion of capitalist economic activity. The possibility that capitalist economic activity might face natural limits as a result of a non-satisfaction of these preconditions (relatively or absolutely) is, however, either marginalized or outright excluded by the theoretical moves just discussed. These moves are of three basic kinds: (1) postulating limitless quantities of some natural conditions/resources; (2) choosing to disregard, as of little actual economic significance, the fact that some desired natural goods are absolutely limited in quantity; and (3) recognizing some natural limits only indirectly, by way of their manifestations within the social-relational system of economic life (as a rise in wages relative to profit, or as an increase in the value of certain commodities).

## 4. Natural Limits in Marx and Engels: An Ecological Critique

In this part of my argument, I will attempt to show that certain key concepts of the economic theory of *Capital* involve a series of related conflations, imprecisions and lacunae, the net effect of which is to render the theory incapable of adequately conceptualizing the ecological conditions and limits of human need-meeting interactions with nature. I also begin to indicate ways in which these theoretical defects might be corrected. It is, perhaps, worth emphasizing that my main aim is the constructive one of using Marx's ideas as conceptual 'raw materials' in order to move towards an ecologically adequate economic theory. I make no claim to expository balance. I have acknowledged already, and will do so later on in this paper, that there is much in the corpus of Marxian historical materialism which is readily compatible with an ecological perspective. But my focus here is quite deliberately upon those features of the economic theory which demand critical transformation if they are to meet this requirement. Even here, my view is (though I do not argue for it) that Marxian economic concepts constitute an indispensable starting point for any

[35] Ibid., p. 293.
[36] Ibid., p. 293.

theory which would adequately grasp the ecological conditions and limits of human social forms.[37]

Notwithstanding their generally critical stance with respect to Classical Political Economy, including Ricardo's version of it, Marx and Engels sustained and deepened *those aspects* of CPE which exemplified its hostility to the idea of natural limits to capital accumulation. In the one area where Ricardo explicitly asserts a natural limit he betrays a concession to Malthus's population theory. As we have seen, Marx and Engels were consistently and forcefully critical of this natural-limits argument. We must conclude that in their mature economic theory, Marx and Engels were even more resistant than Ricardo to the idea of economically significant *natural* limits to capital accumulation. This is, of course, a most important claim, and it requires further substantiation. I have space here to do this only in a very truncated and schematic form.

I shall consider, first, Marx's abstract concept of the 'labour process' as a trans-historical condition of human survival, and, second, his account of the forms taken by the labour-process under specifically capitalist economic relations. In both cases, I shall argue, Marx under-represents the significance of non-manipulable natural conditions of labour-processes and over-represents the role of human intentional transformative powers vis-à-vis nature. A consequence of this is that Marx is prevented from adequately theorizing both the necessary

[37] The following criticisms of Marx and Engels are, of course, by no means the first attempts to confront their work with an environmental perspective. On the issues I discuss below, Bahro's work remains suggestive but rather fragmentary (see B. Frankel *The Post-Industrial Utopians*, Oxford 1987), whilst I have incorporated certain of Gorz's arguments (for example on environmental problems and the falling rate of profit) into my own work. The cited works by Redclift, Walker and Enzensberger have been most useful. H.L. Parsons, *Marx and Engels on Ecology* (London 1977) and D. Pepper, *The Roots of Modern Environmentalism* (London 1984) both deal with ecological issues from a standpoint sympathetic to Marxism. The important and influential work of the 'analytical' Marxists—especially G.A. Cohen, *Karl Marx's Theory of History: A Defence*, Oxford 1978—is directly pertinent to my aims here. Although his exposition of Marx on the forces of production requires separate investigation, it is already clear that on Cohen's reading, Marx is rendered especially susceptible to the type of critique I propose (see esp. Chs. 1, 6 and 11 (9)). The two-volume *Marx's Capital and Capitalism Today* (London 1977 and 1978) by A. Cutler, B. Hindess, P. Hirst and A. Hussain is developed from a very different perspective, but, especially in its discussion of Marx's value theory (Vol. 1, part 1) has some points of contact with my argument here. The authors do not, however, raise questions about the ecological presuppositions or problems of capitalist production. Anthony Giddens's *Contemporary Critique of Historical Materialism* (Vol. 1, London 1981 esp. pp. 20–24 and Chs. 3 and 4), in seeking to discard Marx's evolutionism, simultaneously displaces the nature/society interaction from centre-stage. Somewhat paradoxically, the ecological emphasis of my critique of historical materialism provides added support for Giddens's insistence upon the time–space 'embeddedness' of societies: this is significant precisely because of the social importance of the causal powers and geographical distributions of the objects and materials which are among the indispensable contexts and resources for human social practices. Yet other recent discussions of historical materialism (such as A.T. Callinicos, *Is There a Future for Marxism?*, London 1982, G. Kitching, *Karl Marx and the Philosophy of Praxis*, op. cit., and D. Sayer, *The Violence of Abstraction: the Analytical Foundations of Historical Materialism*, Oxford 1987) whatever their considerable merits in other respects, give relatively little attention to the ecological dimensions of capitalist economic development.

dependence of all forms of economic life upon naturally given preconditions *and* the particularly striking and politically important form that this dependence takes with respect to specifically capitalist accumulation.

**The Labour-Process**

First, then, Marx's concept of the labour-process. This is defined by Marx, as we have seen, as 'the everlasting Nature-imposed condition of human existence'. At this level of abstraction, Marx excludes consideration of the historically variable social relations between persons in the process, whether these be relations materially required by it, or relations (such as those arising out of property ownership) socially imposed upon it. Thus defined, the 'elementary factors' of the labour-process are: '1. the personal activity of man, i.e. work itself; 2. the subject of that work; and 3. its instruments.'[38]

The process itself is an activity in which these elements are brought into appropriate relationships to one another and set in motion: 'In the labour-process . . . man's activity, with the help of the instruments of labour, effects an alteration, designed from the commencement, in the material worked upon. The process disappears in the product; the latter is a use-value, Nature's material adapted by a change of form to the wants of man.'[39] Marx here attempts to characterize human need-meeting activity upon nature as a process in which human activity employs instruments in order to bring about a change in some material object or substance. The change so wrought is intended to fit the object or substance to function as a means to satisfy some human need or want. Marx concedes that some very elementary transactions with nature do not require artificial implements, and here human limbs themselves can be regarded as playing the part of 'instruments of production'. The 'subject' of labour—the thing or material worked upon—may be 'spontaneously provided by nature', or, more commonly, it will have been 'filtered through past labour', in which case Marx speaks (somewhat misleadingly) of 'raw material'. Raw materials are then divided into two categories—those which form the 'principal substance' of the product, and those (such as fuels, dye-stuffs, etc.) which enter into the labour-process, but do not go to form the 'principal substance' of the product. Marx calls these 'accessory' raw materials. Henceforth, I shall speak of 'Raw Materials A' and 'Raw Materials B', respectively.

So far, as we have noted, Marx recognizes among the instruments of labour both human limbs themselves, and objects and materials 'which the labourer interposes between himself and the subject of his labour, and which serve as the conductor of his activity'.[40] But what of other elements and features of the environment within which the labour-process takes place? Marx recognizes that the earth itself (which 'furnishes a locus standi to the labourer and a field of

[38] *Capital*, Vol. 1, p. 178.
[39] Ibid., p. 180.
[40] Ibid., p. 179.

employment for his activity'[41]) as well as results of previous labour such as workshops, canals, roads and so forth may be conditions for labour-processes, without entering directly into them. Marx proposes to include these among the instruments of labour ('in a wider sense'). To recognize, as Marx himself does, that these 'instruments of labour' in the wider sense may be naturally given or the results of previous labour, I shall speak of 'natural' and 'produced' conditions of the labour-process respectively.

Central to Marx's abstract concept of the labour-process, therefore, is the notion of a *raw material A* undergoing a *transformation* to yield a *use value*. This transformation is the outcome of a *human labour* which involves the utilization of *raw materials B* and *instruments of labour* to achieve its purpose. The process involves both human intentional activity, and a range of distinct materials, substances and other non-human beings and conditions. There is, then, a primary, three-fold classification of the elements of the labour-process, in which the non-human elements are resolved into the two categories of 'subject' of labour (i.e. that which is worked upon) and instruments of labour (the conductors of intentional activity). There is also a secondary classification in which these major categories are further sub-divided (Raw Materials A & B, natural and produced Conditions, and so on). What is absolutely clear, however, is that both primary and secondary classifications allocate elements in the labour-process to conceptual categories on the basis not of their material characteristics but of their relationship to the purpose of the labour-process itself. One and the same item may, at different times, figure as product, instrument and raw material of different labour-processes. Which category it falls into on any particular occasion will be a function of what I shall call the *intentional structure* of the labour-process.

Now, it is immediately clear that the intentional structure of the labour-process is, for Marx, a transformative one. It is plausible to suppose that Marx's model is handicraft production of some kind. Carpentry, for example, could be readily represented as having just such an instrumental–transformative intentional structure. With some modifications, the representation might do for productive labour-processes in general, though with the important reservation that in industrial labour-processes the intentionality which assigns each element to its place in the structure is not that of the individual agents in the process. However, and this is the key point, Marx's conceptualization is supposed to represent not just *one broad type* of human need-meeting interaction with nature, but, rather, a universal, 'Nature-imposed condition of human existence'. Marx does, indeed, recognize such activities as felling timber, catching fish, extracting ore, and agriculture as labour-processes. But he constructs his general concept of the labour-process as if these diverse forms of human activity in relation to nature could be assimilated to it.

**Eco-regulation**

Let us consider first agricultural labour-processes. My account, here,

[41] Ibid., p. 180.

assumes such labour-processes taking place on land already cleared and prepared, and using seed or stock animals which already embody past labours of breeding and selection. (To work without these assumptions is, in fact, less favourable to Marx.) My account, at this stage in the argument, also abstracts both from the property relations (or 'social relations of production') within which agricultural labour-processes might be formed and from the great range of specific agricultural technologies which have been and might yet be realized. I am, of course, very far from thinking that such considerations are unimportant. On the contrary, working at this level of abstraction will, I hope, help to illuminate the precise importance of such considerations (for example, in relation to the ecological consequences of 'green revolution' agricultural technologies and the modern capitalist 'industrialization' of agriculture).

In agricultural labour-processes, by contrast with productive, transformative ones, human labour is not deployed to bring about an intended transformation in a raw material. It is, rather, primarily deployed to sustain or regulate the environmental conditions under which seed or stock animals grow and develop. There *is* a transformative moment in these labour processes, but the transformations are brought about by naturally given organic mechanisms, not by the application of human labour.[42] Agriculture, and other 'eco-regulatory' labour-processes thus share an intentional structure which is quite different from that of productive, transformative labour-processes. This is so even where, as in modern capitalist agriculture, the forms of calculation employed by economic agents, and the economic dynamic of the process, more closely resemble the productive–transformative model. Indeed, the primary source of the ecological problems of modern capitalist agriculture lies precisely in the tension between these features and the constraints imposed by its intentional structure as what I call an 'eco-regulatory' practice. The extent of the difference between eco-regulatory and productive practices is the measure of the inadequacy of Marx's abstract concept of the labour-process, which, as we have seen, assimilates all labour-processes to a 'productive' model. For my purposes here the key distinctive features of eco-regulatory practices are as follows.

(1) Labour is applied primarily to optimizing the *conditions for* transformations, which are themselves organic processes, relatively impervious to intentional modification. The 'subject of labour' (in Marx's terminology) is therefore *not* the raw material which will become the 'principal substance' of the 'product' but, rather, the conditions within which it grows and develops.

(2) This labour on the conditions for organic growth and development is primarily (once agriculture is established) a labour of sustaining,

[42] Something already recognized by Adam Smith: 'The most important operations of agriculture seem intended not so much to increase. . . . as to direct the fertility of nature towards the production of the plants most profitable to man. . . . Planting and tillage frequently regulate more than they animate the active fertility of nature; and after all their labour, a great part of the work always remains to be done by her.' Quoted in *Capital* Vol. II, London 1970, p. 365.

regulating and reproducing, rather than transforming (for example, maintaining the physical structure of the soil as a growing-medium, maintaining and regulating the supply of water, supplying nutrients in appropriate quantities and at appropriate times, reducing or eliminating competition and predations from other organic species, and so on).

(3) The spatial and temporal distributions of labouring activity are to a high degree shaped by the contextual conditions of the labour-process and by the rhythms of organic developmental processes.

(4) Nature-given conditions (water supply, climatic conditions, etc.) figure both as *conditions* of the labour-process, *and* as *subjects* of labour, yielding a category of 'elements' of the labour process not readily assimilable to Marx's tripartite classification (labour, instruments of labour, raw materials).

These four features draw attention to the extent of the *dependence* of eco-regulatory practices upon characteristics of their contextual conditions, which are the principal 'subjects' of their labour, and on the organic processes they aim to foster. For any specific technical organization of agriculture, these elements in the process are relatively impervious to intentional manipulation, and in some respects they are absolutely non-manipulable. For example, the incidence of radiant energy from the sun is absolutely non-manipulable. Labour-processes in agriculture are therefore confined to optimizing the efficiency of its 'capture' by photosynthesizing crop-plants, or complementing it with artificial energy-sources. In this case, non-manipulability is a consequence of the scale of the natural mechanisms involved, compared with the causal mechanisms which can be mobilized by human interventions. In other cases, such as climatic conditions, human interventions may, indeed, be cumulatively large enough in scale to have *effects* (e.g. the notorious 'greenhouse-effect'), but these effects do not and arguably cannot amount to intentional manipulation. The combination of epistemic obstacles and the problem of scale confine us to having effects on weather-systems which are predominantly unintended and largely unwanted.

In yet another class of cases—organic processes of growth and development themselves—it might be argued that recent and foreseeable developments in bio-technology are in train to eliminate what I have identified as key distinctive features of eco-regulatory practices. The widespread artificial use of hormones to intervene in organic developmental processes, and genetic engineering technologies both seem to point in this direction. My response, here, would be to suggest that the newer biological technologies have been 'sold' within a voluntaristic–Promethean discourse which has invariably occluded or rendered marginal the limits, constraints and unintended consequences of their deployment in agricultural systems. It is, for example, widely recognized among geneticists that a genetic modification which enhances the utility of an organism for agricultural purposes is generally accompanied by countervailing 'costs': higher yield as against lower resistance to disease, or greater vulnerability to environmental stresses, for

example. Organisms are not mere aggregate expressions of contingently connected and freely manipulable genetic particles.

Let us now turn briefly to the intentional structures of such primary labour-processes as hunting, gathering, mining and so on. These cases are more like production than eco-regulation in one respect: labour is applied directly to the object or material which is the intended repository of use-value. However, there are two major differences between these labour-processes and productive ones. First, the conversion of the 'subject of labour' into a use-value cannot be adequately described as 'Nature's material adapted by a *change of form* to the wants of man'. This conversion is rather a matter of selecting, extracting and relocating elements of the natural environment so as to put them at the disposal of other practices (of production or consumption). These primary labour-processes, then, *appropriate* but do not transform. Secondly, they, like eco-regulatory processes, are highly dependent on both naturally given contextual conditions and the properties of the subjects of labour. In these practices, the place of principal and accessory raw materials is taken by 'naturally given' materials or beings, whose location and availability are relatively or absolutely impervious to intentional manipulation.

Eco-regulation and primary appropriation, then, have intentional structures which cannot adequately be characterized in the terms of Marx's abstract conceptualization of the labour-process. This is because of Marx's implicit 'Procrustean' over-generalization of the intentional structure appropriate to productive, transformative labour-processes. Labour-processes whose intentional structure emphasizes the dependence of labour on non-manipulable conditions and subjects, in which labour adapts to its conditions, sustains, regulates or appropriates its subjects, as distinct from transforming them, are given *no independent conceptual specification*. The significance of their place in the overall 'metabolism' between human populations and their natural conditions becomes literally unthinkable.

**Capitalist Production**

Of course, Marx's abstract concept of the labour-process as a trans-historical condition of human existence is not central to his concerns in *Capital*. It could very plausibly be argued that I have made too much of problems with this one concept. Marx and Engels themselves tended to work with a view of the historical development of the 'forces of production' in which the non-transformative labour-processes I have just discussed are seen less as 'moments' in the total economic life of any particular society, than as forms of interaction with nature which characterized whole previous epochs of human history. Simple appropriation or collection is characteristic of human societies at the lowest level of development of their productive powers, agriculture marking the historical acquisition of powers to wrest from nature means of subsistence which it would not otherwise have provided. This, in turn, is a condition for a further division of labour and the eventual emergence of modern industrial production.

Marx and Engels, like most of their contemporary economic and social theorists, were profoundly impressed by the transformative power of modern industrial production. It was understandable that they should focus upon it and the social relations implicated in it as the central historical dynamic of their time. However, what Marx and Engels never adequately theorized (without, on the other hand, ever quite forgetting) was the extent to which this massive and dynamic sector of 19th-century European economic life remained tied to eco-regulatory and primary-appropriative labours as the necessary sources of energy, raw materials and food, and so, also, to a range of non-manipulable contextual conditions.

To show how and why this was so, it will be necessary to consider the way in which Marx conceptualized specifically *capitalist* production. Central to his analysis is the distinction between capitalist production considered as a process of producing use-values and as a process of producing exchange-values. In its former aspect, capitalist production is a labour-process in which a specific kind of useful labour is set to work 'concretely' to transform a raw material into a specific useful product. In its latter aspect, capitalist production is a process of exploitation of 'abstract' labour which aims at a quantitative increase in exchange value. The second intentional structure is considered to be abstract in the sense that the material properties of the product, the character of the labour which shapes it, and the nature of the want it satisfies are all quite irrelevant to the central purpose of a purely quantitative increment in the value of the product. The social-structural conditions governing economic action under capitalism require that this second, value-maximizing intentional structure must be superimposed upon, and predominate over, the intentional structure of production in its aspect as a utility-producing labour-process. This asymmetrical relation between the two structures is the source of the liability of capitalist economic relations to generate severe dislocations between what is produced and what is needed, and a whole range of irrationalities in the global allocation of labour and material resources in relation to human needs.[43] Although a capitalist economy must in the long run balance production and consumption across the various sectors of production and meet minimal subsistence needs of its labouring population, Marx's analysis is an attempt to show why this must be an unstable, disruptive and crisis-ridden process, rather than a matter of harmonious regulation by a beneficent 'invisible hand'.

Probably because Marx was convinced that the overall dynamics of capital accumulation and the contradictions of this process were rooted in the abstract, value-creating aspect of capitalist production, it was this aspect which constituted the overwhelming topic of analysis in *Capital*. Marx showed relatively much less interest in labour-processes as 'concrete' combinations of specific kinds of labour with specific instruments. Certainly he did give an important place to the

[43] As will become clear later, the claim here is solely that these irrationalities can be explained in terms of the contradictory intentional structure of specifically capitalist production. It is *not* claimed that irrationalities of these kinds are peculiar to capitalism.

distinctively capitalist tendency to replace living labour with machinery, and to transform the technical basis of the labour-process. But his crucial interest was in the consequences of these tendencies for capital accumulation considered in value terms, and for the development of the antagonism between capital and labour. This focus has been continued by Marx's successors in the 'labour-process debate', in ways which have shifted attention away from labour-processes—*including* those involved in capitalist production—as social forms of interchange with nature.[44]

**The Concrete Intentional Structure**

If we turn, now, to consider capitalist production from the standpoint of its *subordinate*, yet necessarily present intentional structure as concrete labour-process, it is possible to show that Marx's account is defective *even with respect to productive/transformative* labour-processes. There are five main features of productive labour-processes which tend to be either under-theorized by Marx, or simply left out of account. These are:

(1) The material nature of both instruments of labour and raw materials will set limits to their utilization/transformability in line with human intentions. Recognition of these limits is a condition of effective practice.

(2) Although the immediate source of raw materials and instruments of labour may be earlier labour-processes, indirectly all must have their source in appropriation from nature (in some form of 'collection'). Persistence of specific production processes is therefore dependent not only upon ancillary production processes, but also upon appropriation from nature.

(3) Labour itself is an indispensable element in the labour-process. Marx treats the activity of labouring as the 'consumption' of the labourer's capacity for work, or 'labour-power'. This, in turn, is treated as the product of the prior labour of producing the labourer's

[44] The seminal work for the contemporary debate on the labour process is, of course, Harry Braverman's *Labour and Monopoly Capital*, New York 1974. The shift of emphasis to which I refer is evident from page 1, where Braverman begins: 'All forms of life sustain themselves on their natural environment; thus all conduct activities for the purpose of appropriating natural products to their own use', but quickly goes on to say: 'However, what is important about human work is not its similarities with that of other animals, but the crucial differences that mark it *as the polar opposite*' (emphasis added). A valuable collection of essays on issues arising from Braverman's 'deskilling' thesis is S. Wood, ed., *The Degradation of Work?*, London 1982. See also P. Thompson, *The Nature of Work: An Introduction to Debates on the Labour Process*, London 1983 and D. Knights, H. Willmott and D. Collinson, eds., *Job Redesign*, Aldershot 1985. In an interesting commentary on an alleged dead-end to the labour process debate ('A Labour Process to Nowhere?', *New Left Review* 165, September/October 1987, pp. 34–5), Sheila Cohen has argued for a reintegration of studies of capitalist labour processes with an understanding of their aspect as social-relational processes of valorization and exploitation. Whilst this comment has some purchase on the recent directions of the debate, it does not call into question the still more pervasive occlusion of the aspect of labour-processes as forms of appropriation of nature.

means of subsistence. Marx's tendency, which he shared with other political economists, to assimilate the processes of production and reproduction of the labourer to those of producing their means of consumption has been subject to widespread feminist criticism. Inconclusive as it has been, the 'domestic labour' debate has at least demonstrated that distinctive labour-processes, conducted *outside* the sphere of capitalist economic relations as they are characterized in *Capital*, are presupposed in the appearance and reappearance of workers with labour-power for sale in capitalist labour-markets. Presupposed by the productive labour-processes of capitalism are ('domestic') labour-processes which have a quite different intentional structure.[45] In their dependence on organic processes of reproduction and development they resemble eco-regulatory practices, but in their affective and normative content they are quite unlike all other labour-processes. Marx's implicit assimilation of these processes to productive processes complements his anti-Malthusian and more general reluctance to recognize 'natural limits'.

(4) Although the dependence of productive practices upon contextual conditions is less apt to figure in the calculations of agents, these practices, no less than primary appropriation, eco-regulation and human reproduction, *are* dependent upon such conditions. Marx recognizes that these conditions include some which are naturally given and others, such as factories and roads, which are products of past labour. But in recognizing the necessity of these conditions, Marx simultaneously fails to recognize their significance by including them *within* the category of 'instruments of production'. These conditions cannot plausibly be considered 'conductors' of the activity of the labourer. By definition, they do not *enter into* the labour-process at all. Moreover, the subjection to human *intentionality* which is implicit in the concept of an 'instrument' is precisely what *cannot* be plausibly attributed to these contextual conditions of production. This is particularly true of naturally given geological, geographical and climatic conditions. Even in the case of productive/transformative labour-processes, then, the conceptual assimilation of contextual *conditions* of the labour-process to the category 'instruments of production' has the effect of occluding the essential dependence of all labour-processes upon at least some non-manipulable contextual conditions. Marx, like Ricardo before him, was able to get away with his occlusion to the extent that such contextual conditions of production could be taken as unproblematically 'given', either being insusceptible to or simply not requiring intentional manipulation under conditions then prevailing.

(5) Finally, Marx's intentional, or 'functional' classification identifies the elements in the labour-process in terms of those properties (causal powers, liabilities and tendencies) in virtue of which they are acted upon or utilized by human agents in order to achieve their purposes. In any actual labour-process these properties of its elements will be

[45] The literature of the 'domestic labour debate' is very extensive. An excellent overview is to be found in M. Barrett, *Women's Oppression Today: Problems in Marxist Feminist Analysis*, Verso, London 1980, Ch. 5, esp. pp. 173–180. See also my own comments in *The Rise and Fall of Structural Marxism*, London 1984, pp. 135–9.

only a *limited sub-set* of the properties really possessed. The remaining properties constitute an indefinitely large 'residual' category which, from the standpoint of the calculations of the agents involved in the labour-process, may be known or unknown, relevant or irrelevant to the achievement of the immediate purposes of the labour-process. Insofar as this class of properties does not enter into the calculations of agents, their practices are liable to have unforeseen and/or unintended consequences which may exceed, counteract or otherwise modify the intended outcome of that or other labour-processes. Insofar as this class of properties did not figure in Marx's characterization of the labour-process, he shared the blindness of agents themselves to the sources of *naturally* mediated unintended and unforeseen consequences of specific practices of activity upon nature. This point will be developed in what follows.

These five general considerations all point in the same direction. In each case, Marx's conception even of productive labour-processes is shown to exaggerate their potentially transformative character, whilst under-theorizing or occluding the various respects in which they are subject to naturally given and/or relatively non-manipulable conditions and limits. From the standpoint of an ecological critique, three important corrections thus need to be made to Marx's conceptualization. First, contextual conditions should be conceived separately from the instruments of labour, as an independent class of 'initial conditions'. Second, the continuing pertinence of these contextual conditions to the *sustainability* of production needs to be incorporated, as with eco-regulatory practices. This is significant in that it renders thinkable the possiblity that these conditions might cease to be spontaneously satisfied, and so require the ancillary labour-process of restoring or maintaining the environmental conditions for productive sustainability. André Gorz has provided an interesting theorization of this possibility in the shape of a postulated environmental foundation for a tendential fall in the rate of profit.[46] Third, some of the naturally mediated unintended consequences of the operation of labour-processes may impinge upon the persistence or reproduction of its contextual conditions and/or raw materials. Where raw materials are absolutely limited in supply, or can be replenished only at a definite maximum rate (e.g. because of their dependence upon organic developmental processes), the labour-processes may undermine their conditions of sustainability in ways suggested under point 2 above.

Where, on the other hand, causal mechanisms are set in motion by the labour-process which are *extrinsic to the achievement of its purposes*, future sustainability may be undermined by another route. Energy and materials entering into the productive process but not embodied in the product, for example, are conceptualized by Marx as 'accessory' raw materials. His account of the intentional structure of production ignores the 'further adventures' of these materials or their residues once they have played their part in the achievement of the intrinsic purpose of the labour-process. This abstraction on Marx's part is justified to the extent that these 'further adventures' bear no relation

[46] A. Gorz, *Ecology as Politics*, pp. 20–8.

to the sustainability of the labour-process in question. However, once the dependence of productive labour-processes on contextual conditions is explicitly recognized, then the possibility that they may be undermined by their own naturally mediated unintended consequences is open to investigation. Among these unintended consequences may be the effects of accessory raw materials and their residues as well as unutilized energy releases upon water supplies, atmospheric conditions, climatic variables, and so on.

So far, I have tried to demonstrate that in a number of respects Marx's account of capitalist production employs a limited and defective concept of productive labour-processes. Each of these limits and defects contributes to an overall exaggeration of the potential transformative power of such labour-processes, at the expense of any full recognition of their continued dependence upon and limitation by other non-productive labour-processes,[47] by relatively or absolutely non-manipulable contextual conditions, and by naturally mediated unintended consequences. I have not, so far, considered the implications for my argument of the *dual* intentional structure of capitalist production: of its status as a process of self-expansion of value. I will reserve this consideration for a later stage in the argument.

## 5. Sources of the 'Productivist' Ideology

### Nature, Capitalism and Emancipation

Next, I shall try to show that these weaknesses in Marx's account of the labour-process are not merely contingent 'errors', particular failings of insight. On the contrary, they are coherent with significant strands in the wider theoretical perspectives of Marx and Engels, and they have a certain plausibility given the historical location of their thinking. First, as we have seen, Marx and Engels were disposed, especially through their critiques of Malthus, to reject as necessarily conservative 'natural-limits' arguments. Whilst they were firmly committed to the view that capital accumulation *was* subject to outer limits, these limits were theorized as *internally* generated by the contradictory social-relational structures of capitalist economies, and mediated through class struggles.

Secondly, notwithstanding their systematic moral critique of capitalism, and their analysis of its transitory nature, Marx and Engels also held an 'optimistic' view of its historical role as preparing the conditions for future human emancipation.[48] In its *progressive* historical role, capitalism accelerates the development of the forces of production to the point where transition to a realm of freedom and abundance becomes a real historical possibility: 'Development of the productive forces of social labour is the historical task and justification of capital. This is the way it unconsciously creates the requirements of a higher

[47] Here, as elsewhere, I am using the productive/non-productive distinction to discriminate between the different *intentional structures* of labour processes, not in the more technical senses in which it is commonly used in Marxist economic debate.
[48] See G.A. Cohen, op. cit., Chapter 7.

mode of production.'[49] Modern industrial production, fostered by capitalist economic relations, is a precondition for the future communist society. The 'historical task' of capitalism is precisely to transcend the conditional and limited character of earlier forms of interaction with nature. Emphasis upon the transformative powers of human social labour, as embodied in industrial capitalist labour-processes, is, then, an intrinsic element in Marx's overall view of the historical process. Moreover, as the above quotation also suggests, this is something which bears not only upon the 'historical task' of capitalism, but on the very conceptualization of the post-capitalist future itself.

Marx and Engels were famously reticent about the character of this communist future. But the brief remarks they did allow themselves always gave central place to the emancipatory potential of a communal appropriation of nature which presupposes the inheritance of highly developed productive forces from capitalist pre-history. Engels's remarks in *Socialism: Utopian and Scientific* are a striking example:

> The whole sphere of the conditions of life which environ man, and which have hitherto ruled man, now comes under the dominion and control of man, who for the first time becomes the real, conscious lord of Nature, because he has now become master of his own social organization. The laws of his own social action, hitherto standing face to face with man as laws of Nature foreign to, and dominating him, will then be used with full understanding, and so mastered by him.[50]

The view of emancipation implicit in this passage and others like it is roughly this: in earlier stages of history, humans have suffered a doubly conditioned lack of autonomy. Insofar as their transformative powers vis-à-vis nature have been limited in their development, they have been at the mercy of, dominated by, the forces of external nature. But superimposed upon this source of domination has been another, rooted in society itself, experienced as a 'second nature'. With the historical development of human social powers vis-à-vis nature there arises the possibility that the tables can be turned with respect to both sources of oppression: humans can acquire communal control over their own social life, and through that, over nature itself.

But if the acquisition of human autonomy presupposes control over nature, this suggests an underlying antagonism between human purposes and nature: either we control nature, or it controls us! No room, apparently, for symbiosis, peaceful co-existence, mutual indifference or other imaginable metaphors for this relationship. At first encounter, it might seem that this view of an underlying antagonism in our relation to nature does, after all, embody a notion of naturally imposed limits. But this is a misleading impression. For Engels, in this passage at least, progress in our productive powers is achieved to the extent that we incorporate what was previously encountered as an external limit within the sphere of conscious human control. Sometimes,

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[49] *Capital* Vol. III, London 1962, p. 254.
[50] F. Engels, 'Socialism: Utopian and Scientific', in C.S. Feuer, ed., op. cit., pp. 149–50.

as in this passage, Marx and Engels speak as if this process could be extrapolated without limit. The metaphor in the early *Manuscripts* of a 'humanization of nature' seems to suggest a potentially residue-less subjection of the natural world to human intentionality. Elsewhere there is a recognition that *some* element of 'struggle' with nature for the necessaries of life is inevitable, the content of emancipation being given in the reduction to a minimum of the time taken up in this struggle. Either way, the possibility of human emancipation is premissed upon the potential for the transformative, productive powers of associated human beings to transcend apparent natural limits, and to widen the field of play for human intentionality. The coherence between this notion of emancipation, the terms in which Marx and Engels criticize Malthus, and the defects in Marx's concept of the labour-process should now be apparent.

**Spontaneous Ideologies of Industrial Capitalism**

I shall shortly return to this question, but first I want to consider a further way of making intelligible Marx's and Engels's systematic exaggeration of the potential transformative power of human action in relation to nature. This approach to the problem makes use of the idea, often employed by Marx and Engels themselves, that certain structures of interaction present to actors who participate in them forms of appearance which are systematically misleading. Actors affected by such forms of appearance will tend to hold mistaken or distorted beliefs about their own activities. Such patterns of mistaken or distorted belief we may call 'spontaneous ideologies'. Insofar as participants in productive labour-processes, especially industrial ones, are not required to attend to the maintenance or restoration of contextual conditions, are not *in fact* confronted with absolute shortages of raw materials, and can ignore the extrinsic, unintended consequences of their practices, then to this extent they are liable to exaggerate their potential transformative powers. Marx could in this way be understood as a victim of a widespread spontaneous ideology of 19th-century industrialism.

But this is by no means the whole story. Here we must return to a consideration of the overriding intentional structure of capitalist production—the intentionality of self-expanding value. As we have seen, Marx and Engels saw the development of the forces of production under capitalism as itself only a secondary—though still necessary—by-product of this primary intentional structure. Now, the very feature which defines this principal dynamic of capitalist accumulation is indifference to the qualitative character of the labour-process. Production on an ever-growing scale is a requirement for the survival of individual capitals, and of the system as a whole. But what is produced, how it is produced and with what resources are entirely secondary to the purpose of quantitative maximization of exchange-values. The labour theory of value, which Marx adopted, albeit with important modifications, from his predecessors in Classical Political Economy, is the central conceptual device through which the limits, contradictions and crises of capital accumulation are rendered thoroughly social-relational. As we saw in the discussion of Ricardo, the

labour theory of value either excludes natural scarcity from consideration, or allows it to be recognized only in the form of its displaced manifestation within the internal, social-relational structure of the economy.

It is tempting to see Marx's focus on capitalist production as a process of maximization of exchange-value by means of the exploitation of labour, his focus on the social relations of production at the expense of the labour-process as yet one more element in his flight from any recognition of 'natural limits'. On this reading, the spontaneous ideology of 19th-century industrialism is overdetermined by a spontaneous ideology of capitalism as a (naturally) limitless process of self-expansion of value. The blindness to natural limits already present in the industrial ideology is compounded and intensified by the overriding intentional structure, with its indifference to the concrete character of raw materials, labour *or* product.

## 6. Towards a Green Historical Materialism

But now we have reached the point in the argument where we can begin to see the potential explanatory *fruitfulness* of Marx's critical account of capitalist accumulation, once defects in his concept of the labour-process are corrected. Only if this part of the argument works can the effort of a critical encounter be shown to pay off!

### Relativizing the Nature/Society Connection

The first step in this more positive task of theoretical reconstruction is to call into question the terms of Marx's and Engels's responses to Malthus. More broadly, it is necessary to recognize that 'natural limits' epistemic conservatisms can be countered effectively without wholesale retreat into social-constructionism. In effect, this is the error Marx and Engels make. For them, 'relative surplus population', or 'the reserve army of labour', is a *consequence* of the dynamic tendency of capital accumulation. The form taken by the argument in Marx's *Capital* makes the surplus population an effect of the tendency of constant capital to rise as a proportion of total capital. But, in fact, this only follows on the basis of implicit assumptions about the rate at which the working population reproduces biologically. Marx does not acknowledge these assumptions.

However, at least one element in Marx's and Engels's argumentative strategy against Malthus can be endorsed. This is their commitment to relativizing Malthus's law to specific historical epochs (or forms of society). As I have shown, in effect Marx and Engels take historical/social relativization to imply some form of social constructionism. This is not, I believe, required. What *is* required is the recognition that each form of social/economic life has its own specific mode and dynamic of interrelation with its own specific contextual conditions, resource materials, energy sources and naturally mediated unintended consequences (forms of 'waste', 'pollution', etc.). The ecological problems of any form of social and economic life would have to be theorized as the outcome of this specific structure of natural/social articulation.

This approach avoids both the Scylla of epistemic conservatism and the Charybdis of 'social-constructionist' utopianism. Each form of social and economic life is understood in terms of its own specific contextual conditions and limits. These conditions and limits have real causal importance in enabling a range of social practices and human purposes which could otherwise not occur, and also in setting boundaries and limits to their sustainability. At the same time, giving full theoretical recognition to contextual (including natural) conditions and limits in this way opens up alternative ways of conceptualizing the relationship between emancipatory strategies and natural limits.

First, and most important, we can look again at the crucial assumption underlying the technological optimism which Marx and Engels shared with many other theorists of development (ideas which are still very influential). This is the assumption of an intrinsic antagonism between the fulfilment of human purposes, on the one hand, and the forces of nature on the other. Although there were, as we shall see, moments when Marx and Engels criticized this idea, it remains as a presupposition of their view of the relationship between the historical development of the forces of production and the ultimate achievement of human emancipation. Natural conditions and limits tend to be regarded as a primary source of human heteronomy, the progressive function of the development of the forces of production consisting in their *transcendence* of limits by incorporating natural conditions within the sphere of human intentionality: a domination or control of nature.

By contrast, the re-conceptualizations of labour-processes which I am advocating permit an explicit recognition of the ways in which naturally given processes, mechanisms and conditions *make possible* human need-meeting practices which otherwise could not occur. But in any realist or materialist approach, enabling conditions must be understood as simply the obverse side of the coin from limits or constraints. A power conferred on human agents by a specific social relation to a natural condition or mechanism, will also be bounded in its scope by that self-same relation. If, for example, a naturally given water-supply, in the form of a river, is utilized by a human population both for agricultural irrigation and fishing, it figures as an enabling condition for both practices. Insofar as human needs are met and purposes fulfilled by both practices, the combination of the socially established technology with the naturally given condition can be seen as emancipatory. However, once this pattern of interaction with nature is established its continuation is subject to definite limiting conditions. High levels of fertilizer run-off, or irregularities in the outflow of water from irrigation dykes, for example, will have their effects on fish-populations in the river. Only a re-conceptualization of labour-processes along the lines I am suggesting can render analysable such complex patterns of enablement and constraint that are built into all forms of human interaction with nature. It follows from considerations such as this that 'natural limits' arguments are not in conflict with emancipatory projects as such. Provided 'natural limits' are conceptualized in ways which recognize their historical, geographical and social relativity, they are incompatible only with *utopian* would-be emancipatory strategies.

Secondly, since natural limits are themselves theorized, in this approach, as a function of the articulated combination of specific social practices and specific complexes of natural conditions, resources and mechanisms, what constitutes a genuine natural limit for one such form of nature/society articulation may *not* constitute a limit for another.[51] In other words, a fundamental reorganization of the form and dynamics of the interrelation of a society with external nature may have the effect of transcending what were, given the previous mode of appropriating nature, real natural limits. Clearly, if we think in terms, for example, of non-renewable resources as a natural limit, a society which shifts its resource-base, or builds resource-recycling into the intentional structure of its labour-processes, may effectively transcend what previously were encountered as limits. Again, to recognize that specific social and economic forms of life encounter real natural limits is to concede nothing to natural-limits conservatism. On the contrary, it may provide the beginnings of a powerful argument for *transforming* the prevailing pattern of nature/society interaction.[52] Of course, the new form will also be a specific combination of enabling conditions and constraints (with respect to whatever human social purposes prevail within it). Different technical bases for society can be understood in this way as delimiting specific alternative patterns of possibility for further human development. Theorizing such alternative possibility-spaces can help in thinking about 'development' not as a unilinear process of quantitative expansion of the forces of production, but, rather, in terms of a range of qualitatively different ways of realizing human social possibilities.

Finally, there is a third respect in which the approach I am advocating illuminates the relation between emancipatory strategies and natural limits. By giving explicit theoretical recognition to relatively or absolutely non-manipulable conditions and elements in labour-processes, one throws into relief a distinction between technologies which enable a *transcendence* of naturally imposed limits and technologies which enhance *adaptability* in the face of natural conditions impervious to intentional action. Adaptive, as distinct from transformative technologies are at work in some of the most fundamental and distinctive features of human ecology: the building of shelters, clothing, the use of artificial means of transport and so on can be seen as socio-cultural extensions of biological features such as warm-bloodedness which facilitate both survival and well-being in the face of a spectacular range of environmental conditions. A strategic focus on adaptability-enhancing

[51] This proposal corresponds closely to W.H. Matthews's important contribution 'The Concept of Outer Limits', in W.H. Matthews, ed., *Outer Limits and Human Needs*, Uppsala 1976: 'The limits are not, in all cases—nor even in most cases—explicit, predictable, discrete thresholds which if exceeded produce catastrophic results, regardless of how they are approached. The mental image should not be one of the edge of a cliff where a single additional step plunges one to the depths below. The concept is much more complex and requires full consideration of the role man plays in setting the limits, since these are determined in two ways: (a) by the quantity of existing resources and the laws of nature; but also, (b) by the way man conducts his activities with respect to his natural situation' (pp. 16–17).

[52] An argument which, as we have seen, Engels was himself able to use against Malthus.

technologies may be no less emancipatory, and is certainly likely to be far more sustainable than the transformative focus which predominates in our civilization.

**Rethinking Labour-Processes and Ecological Politics**

Two proposals for positive work of theoretical reconstruction emerge from these admittedly extremely abstract and entirely provisional considerations. The first would be an extension of what I have tried to do above by way of providing a provisional typology of labour-processes and representing their intentional structures. This would give special attention to the character of labour-processes as modes of social appropriation of nature, so displacing the centrality of the focus on social-relational aspects in the labour-process debate as currently conducted. To do this is not in any way to argue for a 'demotion' of social-relational issues; the point is rather to suggest that the patterning and dynamics of power relations and social conflicts in the labour-process, and in the wider society, will be viewed very differently on the basis of a re-conceptualization of the labour-process itself.

Two examples of this spring to mind immediately. One is that the structure of possibilities open to workers in resisting new technologies is highly dependent upon material properties and causal powers of technologies, many of which are *extrinsic* to the intentional sructure of the labour-process (i.e. properties and powers other than those in virtue of which the technology is employed). A second example concerns the wider environmental unintended consequences of labour-processes. Some of these have highly differentiated impacts on the quality of life for different categories of social actors. The political significance of this in terms of the patterning of conflict along lines of cleavage related to gender, residential location, occupational situation, life-style and so on needs to be understood, and integrated with the more traditional focus on lines of class cleavage arising 'at the point of production'. For example, 'green revolution' technologies in agriculture, depending on the political, social and economic conditions of their introduction, are liable to produce direct consequences for distributional inequality and rural class structure. Owing to the relatively high levels of capital outlay required, economies of scale and differential access to credit, larger farming units typically benefit more, and more quickly, than smaller ones. The tendency towards capitalist relations in agriculture is accelerated, peasant farmers are dispossessed and converted into landless rural or urban labourers, and so on. These processes are well recognized and much discussed. But they exist alongside and articulate with the socio-economic effects of *naturally mediated* unintended consequences of the new agricultural technologies. Again, there will be much variation from locality to locality, but, typically, the greater intensity of farming and associated simplification of local ecosystems will put increasing pressure on traditional practices which rely on various types of primary appropriation from natural and semi-natural habitats (the collection of firewood, fishing, hunting, gathering of fruits and seeds, and so on). Pesticide and nutrient seepage into water-supplies and fisheries, too, may contribute to these processes, and impose other costs on the

quality of life of agricultural and non-agricultural populations alike. Again, pesticide residues and chemical additives associated with forms of food-processing and storage which are themselves adjuncts of green-revolution farming techniques have implications for the diet and health of consumers of agricultural goods well beyond the boundaries of those social groups affected by the immediate socio-economic consequences of agricultural reorganization. It remains to be seen what forms of oppositional alliance could be established among such disparate groupings and what goals they might formulate, but the necessary analysis cannot even begin until the category of 'naturally mediated unintended consequences' is fully integrated into social and economic theory.

A second possible avenue for further theoretical work would be to reconceptualize the Marxian typology of modes of production, as articulated combinations of forces and relations of production. This would entail, *in each case*, not only specifying the social-relational aspects of each mode and the intentional structure of the labour-process (in Marx's terms, the characteristic forces and relations of each mode), but also *complementing* this with a non-intentional characterization of the contextual sustaining conditions and liability to generate naturally-mediated unintended consequences.[53] Each mode would, in other words, be thought of as instantiating a specific form of nature/society interaction, and as having its own distinctive ecological 'niche'. Each mode must be conceptualized in terms of its own peculiar limits and boundaries, and its own associated liabilities to generate environmental crises and environmentally related patterns of social conflict.

Such a project would help to do away with two highly pervasive misconceptions of our contemporary environmental crisis. First, as this line of analysis shows, the contemporary crisis cannot be understood as the direct, unmediated consequence of either 'population' or 'industrialization'. Environmental impacts are a function of complex combinations of social practices and their contextual conditions, not of persons and their appetites. Secondly, we are confronted with at least two broad categories of social-structural embodiment of industrial societies: 'Western Capitalist' and 'State Socialist', together with several variant forms which do not fit easily into either category. It is clear that *each* of these historical forms has its environmental contradictions, and equally clear that their patterns, dynamics and emergent lines of social and political cleavage are very different. It should also be noted that there is widespread evidence of often catastrophic environmental contradictions affecting both pre-industrial and

[53] This proposal, though conceptualized differently, is very much in line with Timpanaro's comments on the abandonment by contemporary Marxists of the materialist thesis of the dependence of man on nature: 'The position of the contemporary Marxist seems at times like that of a person living on the first floor of a house, who turns to the tenant of the second floor and says: "You think you're independent, that you support yourself by yourself? You're wrong! Your apartment stands only because it is supported on mine, and if mine collapses, yours will too", and on the other hand to the ground-floor tenant: "What are you saying? That you support and condition me? What a wretched illusion! The ground floor exists only in so far as it is the ground floor to the first floor . . ."' *On Materialism*, op. cit., p. 44.

non-industrial economic formations. As the foregoing points imply, it is a mistake to suppose that capitalism is the root of *all* ecological evil. I think it can be shown that capitalism is a mode peculiarly liable to ecological crisis, but it must not be forgotten that other modes, too, have their own distinctive ecological crisis-tendencies.

**Building on Marx and Engels**

Finally, I shall return, briefly, to exegesis of Marx and Engels on these questions. A 'productivist' 'Promethean' view of history is widely attributed to them. I have, for the purposes of the above argument, tended to accept this reading, and have delved into some of the conceptual 'substructure' which underpins it. But, whilst I remain committed to the above ecological critique of their work, it is also necessary to recognize the basis for another, quite different reading, in which their explicit or tacit acknowledgement of some of these ecological arguments may be emphasized. Engels, for example, in his critique of social Darwinism adopts a much wider concept of 'production' than the 'transformationist' one I have criticized.[54] Here, he contrasts collection with production, conceiving of the latter as any practice by which human beings prepare means of life which nature itself would not have provided. This does not necessarily involve the 'raw materials/instrument/transformation' pattern of production in the narrow sense, and is consistent with adaptive and regulative models of natural/social interactions as well as with domination/control/transformation models.

Both Engels and Marx do also have ways of characterizing the future society which deliberately avoid the 'triumphalism' and utopianism of the 'productivist' account. One very striking example is also provided by Engels:

> Thus at every step we are reminded that we by no means rule over nature like a conqueror over foreign people, like someone standing outside nature—but that we, with flesh, blood and brain, belong to nature, and exist in its midst, and that all our mastering of it consists in the fact that we have the advantage over all other beings of being able to know and correctly apply its laws.[55]

The following well-known passage from *Capital* Vol. III is easily read as confirming the Promethean view of a historical struggle to subdue and control the forces of nature:

> With his development this realm of physical necessity expands as a result of his wants; but, at the same time, the forces of production which satisfy these wants also increase. Freedom in this field can only consist in socialised man, the associated producers, rationally regulating their interchange with nature, bringing it under their common control, instead of being ruled by it as by a blind power . . .[56]

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[54] See T. Benton, in Mepham and Ruben, op. cit.

[55] From the 'Part Played by Labour in the Transition from Ape to Man', in Marx and Engels, *Selected Works*, London 1968, pp. 361–2. It should not be forgotten that one of Engels's earliest works is, in effect, a denunciation of the environmental consequences of capitalist industrialization, 'The Condition of the Working-Class in England', in K. Marx and F. Engels, *Collected Works*, Vol. 4, London 1975.

[56] *Capital* Vol. III, p. 820.

But if we read this passage as postulating not the bringing of nature under common control, but rather, '*interchange* with nature', then it is quite consistent with the idea of a form of interaction with nature which integrates ecological self-regulation within its intentional structure. There is, indeed, other textual evidence to support such a reading. An important example, to which I shall return, is Marx's discussion of the deleterious effects of capitalist agriculture on soil-fertility: 'By this action it destroys at the same time the health of the town labourer and the intellectual life of the rural labourer. But while upsetting the naturally grown conditions for the maintenance of that circulation of matter, it *imperiously calls for its restoration as a system, as a regulating law of social production*, and under a form appropriate to the full development of the human race.'[57]

These passages suggest that both Marx and Engels did recognize the transhistorical necessity of human dependence upon naturally given conditions and limits to their social activity. Crucially, the latter quotation from Marx quite explicitly advocates ecological sustainability as a 'regulating law' which would govern socialist agriculture, by contrast with its capitalist form. This complements and continues a central theme of Marx's early writings: a critique of regimes of private property in terms of the estrangement they presuppose and reimpose between humans and the natural world. An external, instrumental relation between humans and the natural conditions, contexts and subjects of their life-activity displaces an orientation to nature in which such activity is a source of intrinsic aesthetic, intellectual and spiritual fulfilment. Communism will restore to the human species these lost dimensions of their relationship to their non-human environment.

**An Ecological Crisis-tendency of Capitalism?**

I now turn to some brief indications of how Marx's account of specifically capitalist production might be revised in such a way as to provide a powerful explanation of the peculiar liability of this economic form to generate crises of an ecological kind. The argument as developed so far is sufficient for us to see in very general terms why this might be. The dominant labour-processes of industrial capitalism, which have transformative intentional structures, are, as we have seen, liable to sustain spontaneous ideologies in their economic agents which exclude or occlude their dependence upon contextual conditions and limits. The conceptualizations of the political economists, including Marx, tend simply to reflect the forms of calculation of the economic agents themselves in this respect. Moreover, the value-maximizing intentional structure which is superimposed upon and predominates over the productive intentional structure *intensifies* the latter's insensitivity to material conditions, resources and limits by its very indifference to the concrete character of the process. Insofar as the expansive dynamic of capital accumulation also requires the production of use-values on an ever-expanding scale, it follows that the intrinsic dynamic of capitalist production is a tendency to exceed its

[57] *Capital* Vol. I, pp. 305–6, emphasis added.

extrinsic conditions of sustainability, and, moreover, to do this in ways which are excluded or occluded *by the forms of calculation available to economic agents*. Even if these forms of calculation were to *become* available, through a shift in the ideology of capitalist economic agents, the constraints implicit in their economic situation would preclude any significant shift to an 'eco-regulatory' orientation in practice.

This is, of course, a highly schematic and abstract specification of a distinctively capitalist ecological crisis-generating mechanism. To render it more specific and concrete would require us to follow Marx himself in considering the conditions for the reproduction not of individual illustrative examples of capitalist production, but of the total social capital. This is Marx's concern in Vol. II of *Capital*, and what he has to say there is potentially very illuminating. As Marx notes, once we consider individual capitalist processes of production in the context of the circulation of the total social capital, conditions previously *assumed* as 'given' now must be recognized as problems requiring theorization:

> . . . in both the first and the second Parts it was always only a question of some individual capital, of the movement of some individualized part of capital.
>
> However the circuits of the individual capitals intertwine, presuppose and necessitate one another, and form, precisely in this interlacing, the movement of the total social capital.[58]

Marx's theorization of these relations of mutual presupposition and necessitation of individual capitals involves him in a direct recognition of the pertinence of broad categories of *use-values* in the products and materials employed by these individual capitals. Marx's distinction between Departments I and II (production of means of production and of articles of consumption, respectively) does precisely this. The continuity and scale of capitalist production in one 'Department' is dependent upon that in the other, and vice-versa. The output of Department II, for example, must be equivalent to the total value of the variable capital (labour power) employed in Departments I and II combined (neglecting, for simplicity's sake, capitalists' consumption). In this way, Marx is able to specify the proportionate allocations of capital and labour to the different branches of production which would be required for a crisis-free reproduction of the conditions of production, firstly at a constant rate, and then on an expanded scale.

However, although Marx's account does embody a recognition that these reproduction requirements include both 'the value as well as the substance of the individual component parts' of productive capital,

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[58] *Capital* Vol. II, p. 357. Of course, I have only scratched the surface of what Marx has to say on the conditions of reproduction of the total social capital. My guess, here, is that a fresh look at the debate arising from Rosa Luxemburg's famous use of Marx's reproduction schemes to develop an hypothesis of necessary external limits to capitalist accumulation would yield some interesting insights for an ecological critic. See R. Luxemburg and N. Bukharin, *Imperialism and the Accumulation of Capital*, ed., K. Tarbuck, London 1972.

his representation of these conditions is conducted primarily in value-terms. Marx focuses upon the analysis of the conditions under which 'the individual capitalist can first convert the component parts of his capital into money by the sale of his commodities, and then reconvert them into productive capital by renewed purchase of the elements of production in the commodity-market'.[59] Clearly, the *immediate* conditions of this possibility include sufficient means of exchange (money) and appropriately proportionate prior allocations of capital and labour across the different branches of production which supply these particular elements of production. Equally clearly, among the *mediate* conditions of this possibility are the quantitative proportions of the use-value outputs of those labour-processes which appropriate energy, raw materials and means of subsistence from nature. Marx does not deny this. Indeed, he comments approvingly on Quesnay's statement of it: 'The economic process of reproduction, whatever may be its specific social character, always becomes intertwined in this sphere (agriculture) with a natural process of reproduction. The obvious conditions of the latter throw light on those of the former, and keep off a confusion of thought which is called forth by the mirage of circulation.'[60]

Notwithstanding Marx's explicit recognition that the whole immense intertwined process of circulation of the total social capital remains bound to its naturally given conditions, and to the labour-processes of primary acquisition, he does not pursue the further implications this thought might have. Among these implications, especially if combined with the rectifications I have proposed in Marx's concept of the labour-process itself, are a number of insights into the ecological crisis-generating tendencies of capitalist accumulation. First, it becomes possible to perceive in crises of disproportion the mediated and displaced manifestations of crises of an ecological nature whose source is located in those labour-processes such as extraction and eco-regulation which are at the 'interface' between the total social capital and its natural preconditions. Second, it becomes possible to recognize those branches of 'production' (energy generation, the extractive industries, agriculture and forestry) through which the primary appropriation of nature is conducted as economic *loci* which focus and concentrate the generalized tendency of capitalist production to exceed its natural limits. They are, so to speak, 'pressure points' towards which the ever-growing material requirements of all other social practices are conducted and through which they must flow. Thirdly, it is, as we have seen, precisely in these practices that the intentional structures and forms of calculation of value-maximization and transformative action are most severely inappropriate to the sustainability of the practices concerned. Perhaps this is why it was almost exclusively with respect to agriculture that Marx was able to recognize, if only descriptively, the tendency of capitalism to destroy its own natural conditions of possibility: 'Capitalist production . . . disturbs the circulation of matter between man and the soil, i.e. prevents the return to the soil of its elements consumed by man in the

[59] *Capital*, Vol. II, p. 397.
[60] Ibid., p. 363.

form of food and clothing, it therefore violates the conditions necessary to lasting fertility of the soil. . . . Moreover, all progress in capitalistic agriculture is a progress in the art, not only of robbing the labourer, but of robbing the soil, all progress in increasing the fertility of the soil for a given time, is a progress towards ruining the lasting sources of that fertility.'[61]

The hope, finally, is that by beginning to identify and characterize the mechanisms of ecological crisis-generation we can ultimately move beyond the methodological weakness of much contemporary ecological analysis which operates by groundlessly extrapolating the mere empirical trends.

**Some Concluding Reservations**

The above analyses are, of course, very partial and abstract. They focus upon labour-processes in general, and capitalist production in particular. No attempt has been made to identify and describe ecological crisis-generation in, for example, state-socialist societies. Nor have I given extended treatment of the ecological implications of the forms and dynamics of material consumption, important as these are for any political strategy which incorporates an ecological perspective.[62] Nor indeed, have I considered the powers of economic intervention of capitalist states, in their role as global regulators of the conditions of capitalist production and reproduction. If capitalist economies have intrinsic ecological crisis-generating mechanisms, it remains to be seen whether these crises, along with the more widely recognized forms of economic crisis, can be effectively managed by way of legislation and state interventions. It can also plausibly be argued that some of the great ecological dangers now confronting us are neither direct nor mediated effects of economic relations and dynamics, but arise from relatively autonomous strategic and military policies of nation-states and alliances. Finally, my analysis contributes towards, but by no means fully confronts, the most distinctive and dangerous feature of our contemporary ecological crisis: its *global* character. The question is not solely one of identifying the ecological crisis-tendencies of specific modes of social and economic life. It is the further, and almost unimaginably complex one of interpreting the combined and overdetermined interactions of these diverse mechanisms at the level of the ecosphere itself. More, even, than this, 'the point is to change it'.

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[61] *Capital*, Vol. I, op cit., pp. 505–6.

[62] A critical discussion of C.P.E.'s assumption of 'limitless desires' as subjective conditions for capital accumulation (exemplified in the passage from Ricardo quoted above, p. 52) would be a useful starting point, here. It would have to tackle the question of how to conceptualize human needs, and the limits to the commodification of the means of satisfying them. Important recent work which takes us in the direction of such a theory of needs includes W. Leiss, *The Limits of Satisfaction*, London 1978; K. Soper, *On Human Needs*, Brighton 1981; and L. Doyal and I. Gough, 'A Theory of Human Needs', *Critical Social Policy* No. 10, Summer 1984. See also my own suggestions for a naturalistic, but non-reductionist theory of needs in T. Benton, 'Humanism vs. Speciesism? Marx on Humans and Animals', *Radical Philosophy* 50, Autumn 1988, esp. pp. 13–15.