

HUMAN ECOLOGY, PROCESS PHILOSOPHY AND THE GLOBAL ECOLOGICAL CRISIS

Arran Gare

Philosophy and Cultural Enquiry, Swinburne University,
P.O. Box 218, Hawthorn, Vic., 3122, Australia.
Email: agare@swin.edu.au.

Introduction: Global Environmental Destruction

According to the most advanced studies of global warming and its effects,

Large swaths of the planet will be plunged into misery by climate change in the next 50 years, with many millions ravaged by hunger, water shortages and flooding... [P]arts of the Amazon rainforest will turn into desert by 2050, threatening the world with an unstoppable greenhouse effect.... Land temperatures will go up 6°C by the end of the next century. ([Brown](#), 1998).

How can we explain a civilization able to generate such destruction?

Stephen Bunker in his study of the exploitation of the Amazon Basin offers one analysis ([Bunker, 1988](#)), an analysis formulated from the perspective of human ecology. It is the outcome of a globalised economy characterized by huge concentrations of power. Analysing the flows of usable energy in the world economy, Bunker pointed out the difference between economies of the core zones of the world economy based on production of goods and those in the semi-periphery and periphery based on the extraction of resources to trade for such goods. Extractive economies, as they "develop", use up their reserves and are impoverished, while the productive economies of the core zones, as they develop, increase their power to dominate and exploit the extractive economies. The regulatory structures of semi-periphery regions, such as the Brazilian state bureaucracy, become vehicles through which core zones have been able to intensify exploitation of and extraction from the peripheries. As [Bunker](#) summed up the situation:

The flow of energy from extractive to productive economies reduces the complexity and power of the first and increases complexity and power in the second. The actions and characteristics of modern states and their complex and costly bureaucracies accelerate these sequences. Modernization, as ideology, as bureaucratic structure and procedure, and as centralized control through complex regulatory organization, mediates and intensifies the socio-economic consequences of the interaction between global and regional systems. ... The modern state is but one of the forms of social organization which draw on energy flows out of modes of extraction and which extend the dominance of energy-concentrating modes of production, both globally and within nations.... The differences between the internal dynamics of modes of extraction and of modes of production create unequal exchange not only in terms of the labour value incorporated into products but also through the direct appropriation of rapidly depleted or non-renewable natural resources. Extractive appropriation impoverishes the environment on which local populations depend both for their own reproduction and for the extraction of commodities for export. (p.21f.).

Bunker went on to show in detail the destructive effect on the Amazon basin and its local

inhabitants of the international economy and the Brazilian bureaucracy, showing how:

Once the profit-maximizing logic of extraction for trade across regional ecosystems is introduced ... price differentials between extractive commodities and the differential return to extractive labour stimulate concentrated exploitation of a limited number of resources at rates which disrupt both the regeneration of these resources and the biotic chains of co-evolved species and associated geological and hydrological regimes. (p.47).

Bunker's study of the exploitation of Amazonia illustrates how the transferral of most of the usable energy in living and fossilised plants to a small part of the world is generating ecologically costly over-exploitation of natural resources and socially costly hypercoherence. And as he pointed out,

Hypercoherence ultimately leads to ecological and social collapse as increasingly stratified systems undermine their own resource base. ... The exchange relations which bind this system together depend on locally dominant groups to reorganize local modes of production and extraction in response to world demand, but the ultimate collapse will be global, not local. The continued impoverishment of peripheral regions finally damages the entire system. (p.253).

The greenhouse effect, an effect due mainly to the burning of fossil fuels and to the destruction of rainforests throughout the world, an effect which will turn much of the Amazon rainforest to desert, can be seen as the most obvious manifestation of this undermining of the entire system ([George 1992](#), chap.1).

Responding to Global Environmental Destruction

But there are deeper roots to the present state of the world than its power structure. After detailing the disastrous effects on Amazonia of its interaction with the global economy, Bunker concluded that the only way to prevent such destruction is to radically revalue nature, labour and community and to create an egalitarian human society which sees itself as part of, rather than the master of nature. What is required immediately are changes in the class structure of peripheral countries and efforts to reduce the economic inter-relationships between peripheries and core zones, to allow the peripheries to develop their economies more autonomously: "Ultimately, the need is to slow the flow of energy to the world center." (p.253) But this is not the direction governments are taking.

In fact, policies being adopted throughout the world are the opposite of those suggested by Bunker. Those promoting the kind of policies called for by Bunker are regarded as unrealistic. Why? The dominant discourse in the modern (or postmodern) world, the discourse which defines reality for those who formulate public policy, is economics.

For economists, what really exists are producers and consumers, markets, means of production, goods, services and "amusements" and the activities of producing, selling, buying and consuming. The real possibilities are what can be produced, marketed and consumed. The good is what is "economic", the "bad" what is "uneconomic", as defined by the market. The good of society as a whole is measured by its GNP per head of population and its rate of growth, and by its balance of trade. In this scheme of things, nature barely exists ([Groh and Sieferle, 1980](#), p.569) Of course there is the problem of the people who will die from starvation over the next century as the climate changes. But the economists have shown that this is unimportant. People's lives can be evaluated through the market. Lives of people in the peripheries of the world economy are deemed to have a low price ([Lean, 1995](#), p.1). When

the calculations are done, it is clearly cheaper to let them die than to slow economic growth by trying to limit greenhouse gas emissions. And in the future, despite some environmental destruction and the termination of some cheap lives, the conditions of most people's lives will improve with improving technology.

Progress towards this end can be achieved most quickly through the free operation of the market. Nothing must stand in its way. All trade barriers must be abolished and all individuals, all organizations, all countries must subject themselves to the judgement of the global market. We have to accept the dissolution of all communities which cannot survive in the market and we have to accept degradation of the local and global environment unless it can be shown to be more profitable to do otherwise.

Public Policy, Economics and the Politics of Truth

The deeper problem then is the culture which now dominates the world, a culture in which the categories of economics are taken to define reality. How should this situation be confronted? What is required are categories which can replace the categories of economics as the basis for defining reality. Public policy should be formulated on the basis of a proper understanding of humans and their relationship to the rest of nature, and if the human ecologists are right, this is not being provided by economics. In fact the economists are clearly unrealistic. What is the alternative? Could human ecology provide such an understanding and the categories which would replace economics? And how would it need to be developed to provide the foundation for formulating public policy?

The situation is not as simple as it seems. Economics is not merely a way of contriving the world. As Marx realized, economics is the articulation of categories already embodied in the organization of social life. To consider what might be involved in replacing economics we need to look more closely at the role of economics in modern societies.

All deliberations and decisions about what projects to pursue begin with definitions of the situation. These define what is real, including what has happened in the past, what exists, what are the real possibilities and what goals are really worth pursuing. Each society has its politics of truth, as Foucault argued, and at different times different discourses have achieved privileged status in defining reality. These then form the basis for deciding public policy. While in the middle ages theology was the dominant discourse and with modernity, science, in postmodernity economics is becoming the ultimate arbiter in matters of belief. In late twentieth century society, economists have taken the place of medieval priests, economics has taken the place of theology, and the market has taken the place of God.

While natural science now must justify itself through the categories of economics, economics began as an adjunct to the natural sciences. It emerged through the efforts of Hobbes, the physiocrats and Adam Smith to extend the concepts and methods of seventeenth century philosophy of nature to understand people and society. That is, it was a development of scientific materialism. As a world orientation, this cosmology is not only an interpretation of nature, but also a way of relating to it, revealing it as a realm of things, forces and mechanical organisms to be controlled and exploited. At the same time this cosmology has helped constitute social reality ([Dodds and Jacob, 1995](#), chap.2). Through the work of Hobbes and the early economists who wrote about the economy as a real entity, the economy as something that exists and which can be studied, became a reality. Within this scheme of things, humans were conceived of as egoistic mechanisms driven by appetites and aversions or pleasure and pain. The social relations of the economy were then projected by Darwin onto nature, construing nature as a realm of mechanical organisms in a perpetual struggle for survival, and nature so conceived was then used by the social Darwinists as a metaphor for society ([Young, 1985](#)). Through the elaboration of scientific materialism and its incorporation

into society, we have become enclosed in a world where the natural order appears to reflect the social order and the social order appears to exemplify the natural order ([Gare, 1996](#)). In this way scientific materialism has been embodied or incorporated by society.

When the world is seen from this perspective, life dominated by the market appears natural and action to ameliorate the effects of the market, unnatural. This is the case not only of efforts by the welfare state to protect people, but also of efforts to protect "primitive" societies and threatened species or ecosystems from economic activity. Because the market and its imperatives are part of the natural order, transformations by humans of nature brought about by the imperatives of the market are themselves natural. Primitive societies, species or ecosystems no longer able to survive in the modern world should be allowed to follow into extinction the vast numbers of other forms of life which were not able to adapt to new conditions.

The power of this world-orientation lies not only in its coherence as a total perspective on the world, but also in its practical efficacy. It allows its proponents to easily interpret everything in the world and define their relationship to virtually everything, from the objects, forces and organisms of nature to other people and social institutions. In this way the economists' world-orientation is embodied in the organization of life, from the local to the international level. It enables people to work out who they are and what is really important in life, and it enables them to make their way in the world. And it enables them to see that what suffering there is in the world brought about by economic competition and economic growth are natural and necessary costs of progress.

The final triumph of this cosmology is the domination of public policy by neo-classical economics. In the new "neo-liberal" order, the field of politics is no longer a field through which people struggle to define and control their destinies. It is management of society to facilitate the flourishing of the economy. Education is increasingly a business where people pay to have the marketability of their labour power increased. Science is supported only if it produces the kind of knowledge that can be sold as a commodity. The autonomy of the legal system is upheld, but only insofar as it plays a role in the economy's functioning. Historical memory is now being erased as the institutions embodying the long struggle for justice are being dissolved. The past only matters insofar as it defines present property rights. Economics is now irrefutable because it controls and defines other discourses, denying any significance to any cultural field developing knowledge that might challenge its validity.

The Challenge to Economics of Human Ecology

Even with widespread dissatisfaction with "neo-liberalism", efforts to challenge the pre-eminence of the economic definition of reality have had little success. Philosophers are now irrelevant. The challenge to the market by Marxists has dissipated. Sociologists who attempted to supplement economics, flourished with Keynesian economics and the welfare state, but began to disappear as neo-classical economics came to prevail. Political economists and ecological economists have attempted to reformulate economics to take into account institutions, class relations and the second law of thermodynamics, but they also have had little practical success. Scientists concerned about environmental destruction have brought the values imposed by the market economy into question; however, to politicians and the managers of transnational corporations, the resulting public concern is little more than nuisance value. So far no intellectual movement has made any significant inroads into the ascendancy of neo-classical economics.

We can now see why this is so. Neo-classical economics, originally inspired by Newtonian

mechanics and subsequently modelling itself on further developments of physics, has now made scientific materialism into a self-enclosed body of ideas. Economics has become the ultimate reference point for the justification of everything, and as such, transcends all evaluation.

My contention is that if human ecology has the potential to successfully challenge economics as the basic discourse for defining reality, it is because it is capable of elaborating a challenge to the most basic assumptions of not only to economics, but also to scientific materialism - which not only economic thought but social reality itself now embodies. Human ecology is the heir of a long tradition of ideas developed in opposition to the mechanistic conception of the world. It is thereby able to uphold not only a different conception of nature, but also of humans, human society and science. It has the potential to provide a total perspective on the human condition, including the present domination of civilization by economics and scientific materialism, to redefine humanity's relation to nature, the relationships between people and the relationships between individuals and social institutions. It is for this reason that it can redefine what communities are, put in perspective the diverse problems confronting people, and redefine the ultimate goals of humanity.

Ecology and Human Ecology

But this is only a potential. To evaluate this potential and to see how it might be developed it is first necessary to look more closely at the present state and past history of the disciplines of ecology and human ecology.

The term "ecology" was originally utilized to define a field of research in 1866 by the German proponent of Darwinism, Ernst Haeckel. He wrote: "By ecology we mean the body of knowledge concerning the economy of nature - the investigation of the total relation of the animal both to its inorganic and to its organic environment" ([MacIntosh, 1985](#), p.7f.). That is, it was the study of the "homes" of organisms, or with the coining of the terms "ecosystem", the systems of homes. Eugenius Warming characterized ecology's object of study "the manifold and complex relations existing between the plants and animals that form one community ([Worster](#), p.199)" and, developing Warming's ideas, Frederick Clements characterized ecology as "the science of the community" ([Kormondy and Brown, 1998](#), p.29). It is ecology conceived in this way which has been taken up by the human ecologists. It is ecology conceived in this way which has been taken up by the human ecologists. Human ecology is the attempt to articulate ecological theory to encompass humanity while at the same time attempting to give a place to the distinctive characteristics of humans. As Amos Hawley wrote in his classic work, *Human Ecology*:

[E]cology is a point of view which embraces life as a whole as well as particular populations. ... Human ecology represents a specialisation within the broader field of ecology and can be comprehended only when viewed against the background of the parent discipline. ... [E]cology ... [is] the study of both the form and the development of organization in populations of living things. ... Human ecology may be defined, therefore, in terms that have already been used, as the study of the form and development of the community in human population. ([Hawley, 1950](#), p.66ff.)

At the same time Hawley acknowledged the need to do justice to the specific characteristics and powers of humans. Without taking into account their unique characteristics, human ecology would be sterile. Humans, as cultural beings, are able to devise and accumulate methods of coping with life situations, thereby generating community structures and social dynamics without counterpart elsewhere in the animate world. As Hawley wrote in a more

recent work,

[A] workable relationship with the environment is achieved not by individuals or even species acting independently, but by their acting in concert through an organization of their diverse capabilities, thereby constituting a communal system. What is necessary for lower forms of life is even more compelling for human beings... [A]n understanding of the relationship of human beings to environment requires a full knowledge of the human social system. Until that is developed, an appreciation of the character of environmental influence cannot advance beyond a rudimentary level. ([Hawley, 1986](#), p.3).

But early characterizations of ecology did not guarantee a unified research program. While the term "ecology" has been embraced, ecologists have developed divergent, often irreconcilable approaches according to their assumptions about nature and about what counts as scientific knowledge and according to what aspect of the inter-relationships or organisms they focussed upon ([MacIntosh, 1985](#)). In particular, a strongly individualist and reductionist strand emerged within ecology challenging Warming's and Clements' emphasis on "community". Human ecology cannot ignore the divisions within the discipline of ecology itself. And with the extra problems of dealing with the uniqueness of humans, the problems within ecology generally are exacerbated. It is these problems that led Hans Enzensberger to dismiss human ecology as a "hybrid discipline" in which "categories and methods drawn from the natural and the social sciences have to be used together, despite the fact that this creates complications", concluding: "It is hard to describe the methodological confusion that results from the attempt of a synthesis of this sort ([Enzensberger, 1996](#), p.18)." And even proponents of human ecology such as Edward Kormondy and Daniel Brown noted that:

The problems that confront ecologists must be multiplied several times to understand the challenges facing the human ecologists. Here, an understanding of all the uncertainties of human behaviour must be added to the complexities of environmental interactions among species before a full comprehension of human ecology is possible. This full comprehension may well be impossible to achieve." ([Kormondy and Brown, 1998](#), p.431)

The Philosophy of Nature and Process Philosophy

The problematic state of ecology requires a more careful consideration of the historical and philosophical foundations of the discipline. To see what the issues are we need to look at the early history of ecological thought. The roots of ecology go back before the term "ecology" was coined. They go back at least to the tradition of plant geography inspired by Herder and Goethe, and established by Alexander von Humboldt ([Webster and Goodwin, 1996](#); [Amrine et.al., 1987](#)) as the development of an anti-mechanistic naturalism which saw nature as a dynamic process of becoming of which humans are creative participants. At the end of his career, von Humboldt wrote: "all the organisms and forces of nature may be seen as one living, active whole, animated by one sole impulse. 'Nature,' as Schelling remarks ... 'is not an inert mass; and to him who can comprehend her vast sublimity, she reveals herself as the creative force of the universe - before all time, eternal, ever active, she calls to life all things, whether perishable or imperishable' ([Humboldt 1997](#), p.55)" These thinkers postulated an underlying causal unity within nature in which the visible forms of things are only one aspect, a view which, particularly as it was developed in the philosophy of Schelling, helped inspire the idea that energy is conserved through all transformations in nature ([Kuhn, 1977](#)). Correspondingly, forms of life were conceived of as self-organizing; that is, as creative becoming and an immanent cause of their own becoming. As Ronald Brady described Goethe's morphology (a development of Herder's ideas and an inspiration for von Humboldt):

The forms of life are not 'finished work' but always forms *becoming*, and their 'potency' to be otherwise' is an immediate aspect of their internal constitution - i.e. of their representative function - and not something to be added to them. Their 'potency' is 'self-derived,' in that it is inherent in their identity with the whole. The *becoming* that belongs to this constitution is not a process that finishes when it reaches a certain goal but a condition of existence - a necessity to change in order to remain the same. (Brady, 1987, p.287)

Organisms were seen to be interdependent with each other and their environments. As von Humboldt conceived his subject, "plant geography traces the connections and relations by which all plants are bound together among themselves, designates the lands they are found, in what atmospheric conditions they live ... and describes the surface of the earth in which humus is prepared" ([Nicolson](#), p.170). His work inspired the study of the inter-relationships between organisms among figures as diverse as Lyell, Darwin, Agassiz, Thoreau and Edward Suess, the geologist who in 1875 coined the term "biosphere" ([Worster 1985](#), 132ff., [Grinevald, 1996](#)). The prime source of inspiration for Haeckel and Clements was this anti-mechanist tradition ([Bramwell](#), p.44; [MacIntosh](#), p.43).

Corresponding to such ideas about nature, humans were characterized as creative social beings formed by and forming distinctive cultures conditioned by their geographical conditions and striving to realize their unique potentialities ([Berlin, 1976](#)). The notion of culture as a defining characteristic of humans was originally put forward by Herder but was developed much further by Hegel. Using the German word "Bildung" as an alternative to the concept "formation" to characterize culture, Hegel attempted to generalize Goethe's characterization of organic development to the development of society. Analysing this concept, Gadamer wrote:

Bildung is not achieved in the manner of a technical construction, but grows out of an inner process of formation and cultivation, and therefore constantly remains in a state of continual Bildung... Like nature, Bildung has no goals outside itself... Bildung, as rising to the universal, is a task of man (Gadamer, 1993, p.11f.)

Originally, Hegel saw culture consisting of three dialectical patterns, the dialectic of representation which operates through language, the dialectic of recognition which operates through moral notions, and the dialectic of labour which operates through the use of tools ([Hegel, 1979](#), pp.205-253; [Habermas, 1974](#); [Gare, 1996](#); [Honneth, 1996](#)). Hegel argued that it is only through coming to participate in these dialectical patterns that we become human, able to conceive ourselves as subjects with an identity (to be able to say 'I') among other subjects living in a common world. This notion of culture has underlain all subsequent anti-mechanistic theories of human societies. Ultimately, it is the source of the notion of culture embraced by human ecologists.

From this historical perspective, human ecology should be seen as a development of the German tradition of anti-mechanist thought, allowing humans to be conceived as culturally constituted yet still part of and as potentially creative participants within a dynamic, creative nature.

Such anti-reductionist theories see both the natural and the human world as consisting of processes, with "objects" having a derivative status. The fundamental challenge is to work out what is involved in construing the world as a world of processes rather than things and then reformulating both the natural and the human sciences on this foundation. Those who have taken up this task, those who have continued the tradition begun by Herder and Goethe, are the process philosophers. Process philosophy then should be seen as the philosophical development of the core ideas of the anti-mechanistic tradition begun within Germany. As

such it is a tradition going back not only to Whitehead, Bergson, Dewey and Peirce, but also to these late eighteenth and early nineteenth century German thinkers. And it is a tradition that is now rapidly advancing within the sciences. So, as economics was the science of humanity extending and elaborating the scientific materialist construal of the world, human ecology should be seen as the science of humanity based on the effort to extend and elaborate the tradition of process philosophy.

Non-Reductionist Ecology: Thermodynamics and Hierarchical Ordering of Ecosystems

How then should ecology be understood? Two main strands have emerged within the discipline, the "process-functionalist approach" which treats organisms and their physical environments as integral bio-geo-chemical energetic systems, and the "population-community approach" which focuses on organisms and views ecosystems as networks of interacting populations ([O'Neill et al., 1986](#)). Both of these approaches have had reductionist tendencies. The first led to a form of systems theory which abstracts from the complexity of interacting species, the heterogeneity of populations and the complexities of competition and symbiosis, mutualism and predation. The second led via a fusion with the orthodox synthetic theory of evolution to socio-biology. However, when processes are taken to be the primary beings of the world, then such reductionist tendencies can be avoided and the two approaches can be embraced as complementary ([O'Neill et al., 1986](#)). Furthermore, it is then possible to understand the distinctive features of humans as culturally constituted, creative social agents as participants within these eco-systems. Recent developments in non-equilibrium thermodynamics, hierarchy theory and complexity theory interpreted through and at the same time developing process philosophy, facilitate further integration of these ways of looking at ecosystems.

Approached from the perspective of process philosophy, the most useful starting point for studying ecosystems is the process-functionalist approach, beginning with the energetics of ecosystems. The analysis of energy flows, particularly as these have come to be understood with the development of far from equilibrium thermodynamics, enables us to identify some of the generic features of living processes operating in nature. However, to take this as the whole of biological reality is to commit the fallacy of misplaced concreteness - taking abstractions for reality without appreciating the level of abstraction involved. It is also necessary to examine the nature of hierarchical ordering, then the specific forms of such ordering, and finally, specific life forms and their interactions. The distinctive characteristics of humans must then be fully acknowledged.

From the process-functionalist perspective as this was developed by Lotka and those he inspired, the units of selection in ecosystems are conceived as cycles of energy-and-material flow that have different auto-catalytic properties ([Depew and Weber, 1996](#), 407-412). Organisms tend to be selected by ecosystems that are not only more efficient in their utilization of energy but are capable of tapping previously unused energy sources. And species are favoured which enter into complex cooperative webs with other species, allowing the ecosystem as a whole to maximize the flow through of energy. Through such selection the ecosystem as a whole increases the intensity of energy flows and the rate at which matter cycles through the system, increasing both the total diversity and the total biomass. Such developments of life can now be interpreted as the generation of dissipative structures, structures which emerging in far from thermodynamic equilibrium situations, increase the flow through of energy.

Such ideas were extended to encompass humans and their evolution by Leslie White, Marvin

Harris, Howard and Eugene Odum and Richard Newbold Adams. According to Adams, humans, being capable of symbolic communication, are able to transmit culturally acquired knowledge from generation to generation, including the ability to search for more knowledge. This enables them to continually increase the useful energy forms they are able to exploit. Associated with the growth of such exploitation, humans have developed more complex integrative levels, from bands to tribes, to chiefdoms, to kingdoms, to empires, to nations and then to blocs of nations. With each new integrative level, societies have become more differentiated and hierarchically organized, generating mutually amplifying co-evolutionary systems within these societies. Co-evolution has generated further specialist structures mostly associated with the regulation of society and the means for this regulation (such as educational and research institutions). And so long as these emergent levels and specialist structures enable society to find new sources of usable energy and more effective means of exploiting both the environment and subordinate social structures, these more complex social structures will have the power to maintain and extend themselves.

This is the theoretical framework on which Bunker based his analysis of the global economic system which now dominates the world.

However, what energetics by itself leaves out is an account of the stability of forms of life. While energetics focuses on how competition increases the flow-through of energy, the stability of forms of life is based on cooperation or symbiosis between components, central to which is constraints on competition. The cell, for example, is an organization of component processes. As part of the cell, these do not compete with each other ([Margulis et.al. 1996](#)). The same is true of multi-celled organisms. Such organization is characterized by the emergence of hierarchical levels of ordering which constrain constituents to reproduce these levels. The key to emergence is then the concept of constraint. Counter-intuitively, it is constraints which create new levels of freedom. As Howard Pattee, a leading theorist of hierarchy theory wrote:

The constraints of the genetic code on ordinary chemistry make possible the diversity of living forms. At the next level, the additional constraints of genetic suppressors make possible the integrated development of functional organs and multicellular individuals. At the highest levels of control we know that legal constraints are necessary to establish a free society, and constraints of spelling and syntax are prerequisites for free expression of thought ([Pattee, 1973](#), 73f.).

To identify these hierarchies it is necessary to identify different process rates. "The structure imposed by differences in rates is sufficient to decompose a complex system into organizational levels and into discrete components within each level" ([O'Neill et. al., 1986](#), p.76). Behaviour corresponding to higher levels occur at slow rates, while lower levels are characterized by relatively fast rates.

Taking into account the different spatial and temporal scales and the operation of constraints facilitates a better understanding not only of organisms, but also of ecosystems. At whatever scale is adopted, an ecosystem will tend to be homeorhetic; that is, it will tend to return to its trajectory of development after a perturbation. Such perturbations are by definition outside the system. But such perturbations can be incorporated into an ecosystem when at a higher level of organization some control over the abiotic (non-living) environment is established which is uncontrolled at a lower level. For instance, forests control to some degree temperature, levels of humidity and even rainfall that are beyond the control of individual organisms. Nutrient recycling characteristic of rainforests is also an example of incorporation. In this way abiotic elements, such as soils and climates, become incorporated into ecosystems.

In the resulting stabilized environment, species are selected for their compatibility with other

species rather than with the physical environment. Complexity can then increase as new species find new ways of exploiting an environment that is becoming more diverse. The process continues in positive feedback fashion, with the increasing stability and diversity of the environment allowing an increasing diversity of species. But the development of such complexity is characterised by limitations on competition between organisms and species. It is here that studies based on the population-community approach to eco-systems complement those of the process-functionalist approach. Empirical studies of ecosystems indicate the existence of food webs containing an internal organization constraining competition, with species grouped into sub-systems or modules. While not completely separate from each other, such modules form components of a hierarchical structure that in both analytical and simulation studies are shown to enhance ecosystem stability ([O'Neill et.al., 1986](#), chap.7).

Instability in ecosystems is associated with the breakdown of hierarchical organization. The propensity for this is inherent because ecosystems are characterized by positive feedback as well as negative feedback, and the effect of positive feedback is likely to overwhelm existing constraints. In such circumstances, either a new set of constraints will form, or the system can degenerate, losing the ability to incorporate perturbations. In such ecosystems the slow rate processes will disappear. ([O'Neill et.al., 1986](#), p.175). No drastic alterations in the environment are required for this to occur.

Human Ecology and Human Culture

Hierarchical ordering also needs to be taken into account in human ecology. Most human ecologists have tended to construe culture as communicable knowledge of how to control the world. But as we have seen, culture is much more than this; it is the complex of processes through which individuals emerge who can organize such control. And a more important component of culture is the constraints which make stable social structures possible. To understand this we need to reconsider Hegel's development of Herder's ideas. As we have seen, Hegel conceived human formation whereby people become self-determining agents as involving three dialectical processes, the dialectic of labour, the dialectic of recognition and the dialectic of representation. While human ecologists have focussed on the dialectic of labour and to some extent the dialectic of representation, it is the dialectic of recognition which is more important for integrating communities. It is through the capacity and need to see themselves from the perspective of others to establish their identities which makes possible the crystallization of roles and role relationships, allowing complex forms of social organization. Since the struggle for recognition can only be fulfilled satisfactorily when recognition is reciprocal, this dialectic generates the quest for justice, that is, the full recognition in thought, in action and in the organization of institutions of all people and their significance, what they are, what they have been through, what they have contributed and are contributing to society and what are their potentialities ([Gare, 1996](#), chap. 11). The dialectic of recognition is also behind the impetus to extend knowledge beyond the effort to control things. It inspires efforts to understand the world, our place within it and our significance; that is, to develop a coherent world-orientation.

Like other emergent hierarchical levels, culture consists of constraints. As we have seen, the most important constraints involved in hierarchical organization are facilitative constraints. It is by virtue of the constraints imposed by grammar that we are able to communicate in complex ways. It is by virtue of the constraints associated with the quest for recognition that we are able to develop complex organizations capable of achieving what no other species can. The dialectic of recognition, to the extent that it is effective, constrains people in their thoughts and actions to properly recognize the significance of people and nature. Through accepting these constraints, more complex forms of cooperation become possible. This is how

human communities are formed, whether these be families, towns, nations, classes, blocs of nations, civilizations or the whole of humanity. Individuals committed to justice and to achieving the understanding necessary to be just are more constrained than are other people. But this gives their lives a coherence as self-determining people. They are the people who have integrity, and it is by virtue of their integrity that they can form more enduring relationships with others

The reproduction of culture takes place from generation to generation. That is, relative to the day to day metabolic processes of a society, the processes of cultural reproduction are slow rate processes. But cultures also develop. Hegel argued that through history the tendency has been to move towards increasingly just political, economics and social forms, that is, institutions which recognize more and more adequately the significance, the rationality and the freedom of people ([Hegel, 1956](#)). One of his followers, Friedrich Carové, suggested that we are tending toward the "association of humanity in a divine, fraternal community". ([Toews, 1980](#), p. 139) The cycle of rise and fall of civilizations, and then the tendency for later civilizations to advance in justice over earlier civilizations, are slower rate processes.

Ecological Destruction and Human Ecology

While there is much more to life than this abstract analysis acknowledges, it is now possible to reconsider the present predicament of humanity from the perspective of human ecology, and to briefly outline the different policies which would follow from the adoption of human ecology as the basis of formulating public policy.

The core problem of humanity's relationship to its ecosystems is not just that humans have acquired ever new sources of usable energy and new forms of organization to grow exponentially until they have begun to destroy their environment. The problem is that throughout history humans have learnt to overcome one ecological constraint after another. To begin with, when with the emergence of agrarian societies humans were able to overcome the previous constraints on their development, they then salinated their land or created deserts, while the cities they created were invaded by disease causing organisms which again limited population growth ([McNeill, 1977](#)). That is, the overthrow of one set of ecological constraints enabled rapid population growth and the differentiation and expansion of society, but this was then met by new constraints which again limited population growth. Subsequent to this, societies developed the means to extend their exploitation over far greater areas, so that the destruction of local ecosystems no longer served as a constraint, although such civilizations were still frequently ravaged by epidemics. Later, humans developed means to control diseases. Later still they developed the means to exploit fossil fuels and the produce machinery, freeing them from the energy constraints of all ecosystems, at least in the short term ([Adams, 1982, 1988](#)). One such constraint after another has been overcome, until we have reached our present stage. Now the constraints of local ecosystems throughout the world, but particularly in the peripheries where lie most of the world's tropical forests, are being destroyed, and we are pushing towards the constraints of the global ecosystem, the biosphere. Greenhouse gases, with their effects exacerbated by the destruction of organisms and regional ecosystems which contributed to regulating gases in the atmosphere (for example, the Amazon rainforest) could generate positive feedback loops leading to a runaway increase in global temperature.

However, for this to occur, other constraints must also have been overcome, those associated with culture. Along with developments in technology and means of production, humanity has also been developing organizations embodying more adequate recognition of the significance of people, which has begun to extend to recognition of the intrinsic significance of

non-human forms of life. These include the institutions associated with the modern welfare state and various organizations within the United Nations. These developments have been supported by the growth of understanding, associated with the development of the arts, literature, philosophy and the sciences. The development of process philosophy and human ecology are central to this.

But the domination by an increasingly integrated ruling class in the core zones of the world economy, now empowered by the development of transnational corporations and sustained by massive exploitation of the global environment has not only been able to avoid the constraints of institutions committed to justice, but to subvert these institutions and the cultural processes required to sustain them. We now have a global human society in which its most powerful structures are dissolving most of the constraints on human interaction between societies and with the environment. And what has greatly facilitated this subversion of justice and of cultural life has been the triumph of neo-liberalism based on social Darwinist neo-classical economics.

Human Ecology and Public Policy

This is the state of the world understood from the perspective of a consistently anti-reductionist human ecology. From this perspective we can get some idea of what kind of policies would be prescribed if human ecology were to be developed as the basis for defining reality for formulating public policy. Clearly, we would be concerned to identify the long durational processes operating in ecosystems and to ensure that people do not overwhelm these. The aim should be to develop forms of life which are components of sustainable ecosystems, ranging from local ecosystems to the biosphere. But human ecology would also redefine the nature of society. Rather than conceiving society as an economic system moved by the egoism of individuals, a fully developed human ecology would conceive human societies as culturally constituted communities within nature and it would reveal the necessity of sustaining the longer durational processes of culture's reproduction and development. Finally, instead of abstracting away from power relations as though all that were important were reducing friction in the functioning of the market, human ecology should enable us to understand the power relations within and between communities and organizations and reveal what power relations are required to facilitate the flourishing of human and non-human communities.

With human societies conceived of as emergent phenomena within nature, as communities and communities of communities integrated by cultures, it would be possible to revive and reformulate in naturalistic terms the Hegelian notion that history consists of the self-formation of humanity through the development of cultures. This would involve extending more adequate recognition of people and other life forms and of their communities, implying an appreciation of people as not only producers and consumers, but as creative agents who become human through their participation in the natural processes, economics, politics and cultures of communities. When Hegelianism is reconceived on naturalistic foundations, such recognition must involve an appreciation of the different environments, histories, traditions and circumstances of people and their local knowledge of these environments, histories, traditions and circumstances. Institutionalizing this recognition implies the modification of old or the creation of new institutions to appreciate this uniqueness and to cultivate people's autonomy, enabling the diversity of people throughout the world to control their own destinies and develop their unique potentialities. What is required, as Alasdair MacIntyre has argued ([1984](#)), is a revival of the Aristotelian notion that humans are political animals and that the goal of politics is to enable people to live the good life, conceived as developing their highest virtues to participate in the political and cultural life of their community or communities. We need to refurbish the notion of "citizen" and consider what recognizing people as citizens entails both for individuals and for community.

The most important virtues to be cultivated for people to be and to function as citizens in democratic communities are the virtues of caring, prudence, courage, justice and wisdom, that is, the virtues necessary to participate in, maintain and develop their communities, including the ecosystems of which they are part.

We should then redefine public policy so that its ends are no longer defined as contributing to the flourishing of the market economy or even the welfare of people conceived in utilitarian terms, but facilitating the realization of the highest potentialities of people as creative, culturally constituted and culture creating beings to sustain and augment the natural, social and cultural conditions of their existence. As such, the agents who formulate public policy should no longer be thought of as bureaucrats and politicians, but as the people democratically organized to control their destinies. And developing human ecology so conceived and replacing economics by it should be appreciated as itself part of human self-creation.

However, such ends should be formulated on the basis of a proper appreciation of how power operates in and between societies, what kind of power relations are required for the flourishing of both human and non-human life and what power structures could subvert such ends. The kind of hypercoherence of the ruling elites of the core zones of the world economy, channelling exponentially increasing amounts of energy and nutrients of the global ecosystem and global economy into its further growth, must now be seen as the major problem facing civilization and the major problem which must be addressed by public policy ([Fotopoulos, 1997](#)). This system can now be recognized as a cancerous tumour within the current global ecosystem, an ecosystem peculiarly suited to human life. A remission, as Stephen Bunker realized, involves slowing the flows of energy and nutrients to this tumour. In fact, what human ecology calls for generally is essentially what Bunker suggested - a radical reevaluation of labour and nature, overcoming class divisions, particularly in the peripheral and semi-peripheral regions of the world economy, and reducing the economic interactions between different regions of the world. It is necessary to undermine regional exploitation.

But it now might be possible to say something more definite about specific policies which could be pursued. We can see from hierarchy theory that one of the conditions for stable structures is the imposition of constraints on the interaction between various parts of a system. Such constraints are required to prevent the positive feed back loops which could overwhelm the higher level, slow rate processes. If a global ethico/political order is to prevail over such cancerous growths it will be necessary to maintain the autonomy of cultural, educational and legal/political fields incorporating and sustaining the slow processes of humanity's cultural and political development from the economic processes which they should be constraining. Ultimately, to use Karl Polanyi's terminology, it will be necessary to re-embed the market within the community. A condition for achieving this is an organized decentralization of economic and political power, insulating from each other as much as possible the economies of different communities in different parts of the world. And within each of these different communities, there should again be as much decentralization as possible. Or, to put it another way, as Dudley Seers, Samir Amin, Herman Daly, John Cobb have argued, economies and communities from blocs of nations to nations to cities and bioregions should strive to be as self-reliant economically as possible ([Seers 1983](#); [Amin, 1985](#); [Daly and Cobb, 1994](#)). If humanity suffers from the feedback loops generated by the interaction between the regulative and productive sectors of society, then it is also necessary to constrain these interactions to eliminate such feedback loops. That is, it is necessary to develop organizations in which the differentiations between organizers and the organized, between intellectual and manual workers, are, as much as is practically possible, overcome ([Gare, 1994](#)). It is necessary to totally reverse the policy directions of the neo-classical economists and neo-liberal politicians and begin the process of creating genuine democracies.

References:

- Adams, Richard Newbold, (1975) *Energy and Structure*, Austin & London: University of Texas Press.
- Adams, Richard Newbold, (1982) *Paradoxical Harvest*, Cambridge: Cambridge University Press.
- Adams, Richard Newbold, (1988) *The Eighth Day: Social Evolution as the Self-Organization of Energy*, Austin: University of Texas Press.
- Amin, Samir, *Delinking: Towards a Polycentric World*, London: Zed Books.
- Amrine, Frederick, Zucker, Francis J. and Wheeler, Harvey (1987) *Goethe and the Sciences: A Reappraisal*, Dordrecht: Reidel.
- Berlin, Isaiah (1976) *Vico and Herder*, London: Chatto and Windus.
- Bramwell, Anna (1989) *Ecology in the 20th Century: A History*, New Haven: Yale University Press.
- Brown, Paul (1998) *The Guardian Weekly*, 159, 19, Nov.8, p.1, reporting on "Climate Change and its impacts: Some highlights from the ongoing UK research programme: a first look at results from the Hadley Centre's new climate model" November, 1998.
- Bunker, Stephen, (1986) *Underdeveloping the Amazon*, Chicago: University of Chicago Press.
- Daly, Herman and Cobb Jr., John, *For the Common Good: Redirecting the Economy Toward Community, the Environment and a Sustainable Future*, Boston: Beacon.
- Depew, J. David and Weber, Bruce H. (1996) *Darwinism Evolving*. Cambridge Mass.: MIT Press.
- Dodds, Betty Jo Teeter, and Jacob, Margaret C. (1995) *Newton and the Culture of Newtonianism*. New Jersey: Humanities Press.
- Enzensberger, Hans Magnus (1996) "A Critique of Political Ecology" in *The Greening of Marxism* ed. Ted Benton. New York: Guilford Press, pp.17-49.
- Fotopoulos, Takis (1997) *Towards an Inclusive Democracy*, London and N.Y.: Cassell.
- Gare, Arran (1994) 'Alexandr Bogdanov: Proletkult and Conservation' in *Capitalism, Nature, Socialism*, 5 (2): 65-94.
- Gare, Arran (1996) *Nihilism Inc.: Environmental Destruction and the Metaphysics of Sustainability*, Sydney: Eco-Logical Press.
- George, Susan (1992) *The Debt Boomerang: How Third World Debt Harms Us All*, London: Pluto Press.
- Grinevald, Jacques (1996) "Sketch for a History of the Idea of the Biosphere" in *Gaia in Action: Science of the Living Earth*, ed. Peter Bunyard. Edinburgh: Floris Books, pp.34-53.

- Groh, Dieter and Sieferle, Rolf-Peter (1980) "Experience of Nature in Bourgeois Society and Economic Theory" in *Social Research*, trans. Peter Vintila, No.3, Autumn: 557--581.
- Habermas, Jürgen (1974) "Labour and Interaction: Remarks on Hegel's Jena Philosophy of Mind", in *Theory and Practice* [1971] tr. John Viertel, London: Heinemann, pp.142-169.
- Hawley, Amos H. (1950) *Human Ecology*, New York: Ronald.
- Hawley, Amos H. (1986) *Human Ecology: A Theoretical Essay*, Chicago: University of Chicago Press.
- Hegel, Georg Wilhelm Friedrich, (1956) *The Philosophy of History*, New York: Dover.
- Hegel, Georg Wilhelm Friedrich, (1979) *System of Ethical Life and First Philosophy of Spirit*, trans. H.S. Harris and T.M. Knox, N.Y.: S.U.N.Y. Press.
- Honneth, Axel (1996) *The Struggle for Recognition: The Moral Grammar of Social Conflicts*, Cambridge: MIT Press.
- Humboldt, Alexander von, (1997) *Cosmos*, trans. E.C. Otté, Baltimore: John Hopkins University Press.
- Kahn, Herman, Brown, William and Martel, Leon (1977) *The Next 200 Years: A Scenario for America and the World*, London: Associated Business Programs.
- Kormondy, Edward J. and Brown, Daniel E. (1998) *Fundamentals of Human Ecology*, Upper Saddle River, New Jersey: Prentice Hall.
- Kuhn, Thomas, (1977) "Energy Conservation as an Example of Simultaneous Discovery", *The Essential Tension*. Chicago: Chicago University Press, pp.66-104.
- Lean, Goffrey (24-7-1995), "Third World life is cheap by UN's costing", *The Age*. Melbourne.
- Lotka, Alfred J. (1956) *Elements of Mathematical Biology*. New York, Dover.
- MacIntosh, Robert (1985) *The Background of Ecology*, Cambridge: Cambridge University Press.
- MacIntyre, Alasdair (1984) *After Virtue*, 2nd ed., Notre Dame: University of Notre Dame Press.
- Margulis, Lynn, Guerrero, Ricardo and Bunyard, Peter (1996) "We are all Symbionts" in *Gaia in Action: Science of the Living Earth*, ed. Peter Bunyard. Edinburgh: Floris Books, pp.167-185.
- Margalef, Ramon (1980) *La Biosfera*, Barcelona: Ediciones 62 s/a.
- McNeill, William (1977) *Plagues and Peoples*, New York: Anchor Books.
- Nicolson, Malcolm (1990) "Alexander von Humboldt and the geography of vegetation" in *Romanticism and the Sciences*, ed. Andrew Cunningham & Nicholas Jardine. Cambridge: Cambridge University Press.
- O'Neill, R.V., DeAngelis, D.L., Waide, J.B., and Allen, T.F.H. (1986) *A Hierarchical Concept of Ecosystems*, Princeton: Princeton University Press.

Pattee, Howard (1972) "The evolution of self-simplifying systems" in *The Relevance of General Systems Theory*, ed. E. Lazlo, pp.31-42. New York: Braziller.

Pattee, Howard (1973) *Hierarchy Theory: The Challenge of Complex Systems*, N.Y.: George Braziller.

Prigogine, Ilya (1980) *From Being to Becoming*, San Francisco: Freeman.

Prigogine, Ilya and Stengers, Isabelle (1984) *Order Out of Chaos*, Toronto: Bantam.

Seers, Dudley (1983) *The Political Economy of Nationalism*, Oxford: Oxford University Press.

Simberloff, D.S. (1980) "A succession of paradigms in ecology: Essentialism to materialism and probabilism". *Synthese*, 43, 3-39.

Toews, John Edward (1980) *Hegelianism: The Path Toward Dialectical Humanism, 1805-1841*, Cambridge: Cambridge University Press.

Webster, Gerry and Goodwin, Brian (1996) *Form and Transformation*. Cambridge: Cambridge University Press.

Worster, Donald (1985) *Nature's Economy: A History of Ecological Ideas*, Cambridge: Cambridge University Press.

Young, Robert (1985) *Darwin's Metaphor*, Cambridge, Cambridge University Press.

[Return to Top](#)

