AMERICAN POLITICAL THOUGHT

√Third Edition

Kenneth M. Dolbeare

THE EVERGREEN STATE COLLEGE

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Carolyn Merchant (b. 1936) is a leading scholar and ecofeminist whose current appointment is as professor of environmental history, philosophy, and ethics at the University of California, Berkeley. She earned her Ph.D. at the University of Wisconsin in 1967. Her scholarly work has brought together the fields of the history of science, gender studies, and ecology, in particular showing how the epistemological basis of “science” and the social ideology of male dominance are mutually supporting. In The Death of Nature: Women, Ecology, and the Scientific Revolution (1980), she shows that concepts of nature have always been female and that the task of (male) science is to find ways to dominate and exploit nature-as-female. In many ways, she is rewriting the environmental understanding of the early (Progressive era) conservation movement.

The excerpt here is from two chapters of Merchant’s Ecological Revolutions: Nature, Gender, and Science in New England (1989), in which she develops a provocative theory of the succession of ecological revolutions that change human relationships to nature and the social relations that people have with one another. She sees economics, power structures, dominant worldviews, and gender relations as an integrated whole—changing together in linkage with ecological changes. She argues that an ecological revolution is under way in the 1990s, such that the nature of the American economy and social relations in the United States—and between the United States and the world—are entering a period of fundamental change.
revealed the concerns that would spark his quest to understand the destruction of New England in a historical context. "I spent my early life almost literally in the woods. A large portion of the territory of Vermont was, within my recollection, covered with the natural forest... Having been personally engaged to a considerable extent," he confessed, "in clearing lands, and manufacturing, and dealing in lumber, I have had occasion both to observe and to feel the effects resulting from an injudicious system of managing woodlands and the products of the forest." The changes that Marsh observed and documented in Man and Nature were the culmination of a history of European interactions with the land. They were reflected only belatedly in the New World.

New England is a mirror on the world. Changes in its ecology and society over its first 250 years were rapid and revolutionary. Only through a historical approach can the magnitude and implications of such changes for the human future be fully appreciated. What took place in 2,500 years of European development through social evolution came to New England in a tenth of that time through revolution. This book delineates the characteristics of ecological revolution—colonial and capitalist—through the study of the New England exemplar. Yet the implications extend far beyond the confines of New England. As the American frontier moved west, similar ecological revolutions followed each other in increasingly telescoped periods of time. Moreover, as Europeans settled other temperate countries throughout the world, colonial ecological revolutions took place.

Today, capitalist ecological revolutions are occurring in many developing countries in a tenth of New England's transformation time. In the epilogue, it is suggested that human beings are now entering a third type of revolution—a global ecological revolution—that encompasses the entire earth.

Between 1600 and 1860 two major transformations in New England land and life took place. The first, a colonial ecological revolution, occurred during the seventeenth century and was externally generated. It resulted in the collapse of indigenous Indian ecologies and the incorporation of a European ecological complex of animals, plants, pathogens, and people. The colonial revolution extracted native species from their ecological contexts and shipped them overseas as commodities. It was legitimated by a set of symbols that placed cultured European humans above wild nature, other animals, and "beastlike savages." It substituted a visual for an oral consciousness and an image of nature as female and subservient to a transcendent male God for the Indians' animistic fabric of symbolic exchanges between people and nature.

The second transformation, a capitalist ecological revolution, took place roughly between the American Revolution and about 1860. It was initiated by internal tensions within New England and by a dynamic market economy. Local factories imported natural resources and exported finished products. Air pollution, water pollution, and resource depletion were created as externalities outside the calculation of profits. The capitalist revolution demanded an economy of increased human labor, land management, and a legitimating mechanistic science. It split human consciousness into a disembodied analytic mind and a romantic emotional sensibility.

Each of these "ecological revolutions" was the local ecology, human consciousness, New mutes and technologies—magnifying glasses, clocks, and chemicals—posed on nature. The relationships between men and women through which all were maintained and reproduced were changed. And in turn, consciousness—perceiving, and analyzing—through which socially constructed and interpretative environment were reorganized.

My thesis is that ecological revolutions are major transformations in relationships with nonhuman nature from changes, tensions, and conflicts that develop between a society and its production and ecology, and modes of production and consumption. These dynamics in turn supported new forms of conscious images and worldviews. The colonial and capitalist ecologies in New England may be studied through a description of each system, production, reproduction, consciousness; the processes broke down; and an analysis of solutions between the emerging capitalist society and nonhuman nature.

Two frameworks of analysis are used for discussing the structure of ecological revolutions. In The Structure of Scientific Revolutions, Thomas Kuhn approached major transformations in scientific consciousness from a prescriptive internal to the workings of the community of scientists. Paradigms are structures of thought within groups of scientists within which new paradigms are solved. When a sufficient number of anomalies challenges a scientific system, scientists construct new paradigms in the process of scientific revolutions. From the sixteenth century's Copernican revolution to the Newtonian revolution in the
Each of these "ecological revolutions" altered the local ecology, human society, and human consciousness. New material structures and technologies—maps, plows, fences, clocks, and chemicals—were imposed on nature. The relations between men and women through which daily life was maintained and reproduced were radically changed. And in turn the forms of consciousness—perceiving, symbolizing, and analyzing—through which humans socially constructed and interpreted the natural environment were reorganized.

My thesis is that ecological revolutions are major transformations in human relations with nonhuman nature. They arise from changes, tensions, and contradictions that develop between a society's mode of production and its ecology, and between its modes of production and reproduction. These dynamics in turn support the acceptance of new forms of consciousness, ideas, images, and worldviews. The course of the colonial and capitalist ecological revolutions in New England may be understood through a description of each society's ecology, production, reproduction, and forms of consciousness; the processes by which they broke down; and an analysis of the new relations between the emergent colonial or capitalist society and nonhuman nature.

Two frameworks of analysis offer springboards for discussing the structure of such ecological revolutions. In *The Structure of Scientific Revolutions* (1962), Thomas Kuhn approached major transformations in scientific consciousness from a perspective internal to the workings of science and the community of scientists. Scientific paradigms are structures of thought shared by groups of scientists within which problems are solved. When a sufficient number of anomalies challenges a scientific theory, scientists construct new paradigms, initiating scientific revolutions. The Copernican revolution in the sixteenth century, the Newtonian revolution in the seventeenth,

Lavoisier's chemical revolution in the eighteenth, Darwin's evolutionary theory in the nineteenth, and Einstein's relativity theory in the twentieth are examples of major transformations within various branches of science.

One of the strengths of Kuhn's provocative account is its recognition of stable worldviews in science that exist over relatively long periods of time, but that are rapidly transformed during periods of crisis and stress. One of its limitations is its failure to incorporate an interpretation of social forces external to the daily activities of scientific practitioners in their laboratories and field stations. Internal developments in scientific theories are affected, at least indirectly, by social and economic circumstances. A viewpoint that incorporates social, economic, and ecological changes is required for a more complete understanding of scientific change.

A second approach to revolutionary transformations is that of Karl Marx and Friedrich Engels. Their base/superstructure theory of history viewed social revolutions as beginning in the economic base of a particular social formation and resulting in a fairly rapid transformation to the legal, political, and ideological superstructure. In the most succinct statement of his theory of history, in 1858, Marx wrote: "At a certain stage of their development, the material productive forces of society come in conflict with the existing relations of production... Then begins an epoch of social revolution. With the change of the economic foundation the entire immense superstructure is more or less rapidly transformed."

For Marx, society is an integrated whole. A fabric of economic, political, and intellectual forces exists and evolves as a stable system for periods of time. But at particular times in history, changes are initiated in economic production that bring about
rapid transformations in politics and consciousness. One weakness of this approach is in the determinism assigned to the economic base and the sharp demarcation between base and superstructure. But its strength lies in its view of society and change. If a society at a given time can be understood as a mutually supportive structure of dynamically interacting parts, then the process of its breakdown and transformation to a new whole can be described. Both Kuhn's theory of scientific revolution and Marx's theory of social revolution are starting points for a theory of ecological revolutions.

Science and history are both social constructions. Science is an ongoing negotiation with nonhuman nature for what counts as reality. Scientists socially construct nature, representing it differently in different historical epochs. These social constructions change during scientific revolutions. Similarly, historians socially construct the past in accordance with concepts relevant to the historian's present. History is thus an ongoing negotiation between the historian and the sources for what counts as history. Ecology is a particular twentieth-century construction of nature relevant to the concerns of environmental historians.

A scientific worldview answers three key questions:

1. What is the world made of? (the ontological question)
2. How does change occur? (the historical question)
3. How do we know? (the epistemological question)

Worldviews such as animism, Aristotelianism, mechanism, and quantum field theory construct answers to these fundamental questions differently.

Environmental history poses similar questions:

1. What concepts describe the world?
2. What is the process by which change occurs?
3. How does a society know the natural world?

The concepts most useful for this approach to environmental history are ecology, production, reproduction, and consciousness. The relations among animals (including humans), plants, minerals, and climatic forces constitute the ecological core of a particular habitat at a particular historical time. Through production (or the extraction, processing, and exchange of resources for subsistence or profit), human actions have their most direct and immediate impact on nonhuman nature. Human reproduction, both biological and social, is one step removed from immediate impact on nature: the effects of the biological reproduction of human beings are mediated through a particular form of production (hunting-gathering, subsistence agriculture, industrial capitalism, and so on). Population does not press on the land and its resources directly, but on the mode of production. Two steps removed from immediate impact on the habitat are the modes through which a society knows and explains the natural world—science, religion, and myths. Ideas must be translated into social and economic actions in order to affect the nonhuman world.

How do reproduction and production interact? According to Engels in his *Origin of the Family, Private Property, and the State* (1884), "the determining factor in history is, in the last resort, the production and reproduction of immediate life . . . this itself is of a twofold character. On the one hand, the production of the means of subsistence . . . on the other, the production of human beings themselves." The reproduction of human beings is thus distinct from, but structurally related to, the production of the means of subsistence. A change in the mode of production from gaging to subsistence-oriented agriculture will increase the land to feed people. Intensive agricultural production is, through advances in science, altered. Production and reproduction dialectically. When reproduction is altered, as in population changes in property inheritance, the ecological system is affected. Conversely, when changes, as in the addition or decrease of resources in technological innovation, reproduction and biological reproduction are altered. A dramatic change at the reproduction level is the dynamic between them, in the major transformation of the ecological system. Whereas the colonial ecologies in New England resulted from the effects wrought by European production and reproduction, the ecological revolution was inevitable. The ecological revolution was the result of pressures between production and reproduction. Because of the 11th-century land competition, each family produced its own labor force in order to increase subsistence for the future. On the other hand, a portable system of inheritance meant that family production increased over three or four generations. This point is that not all sons of wealth enough land to reproduce the system. The tensions between the means of subsistence-oriented (large family labor force) and production through partible (all sons must inherit farms) set a wage labor supply of 4 needed for the transition to a capitalist system.

Socialist-feminists have focused on the interaction between production and reproduction. In her *1976 Dialectics of Production and Reproduction*, Eva Herman argued that production and reproduction are in constant tension. Production is seen as the source of power, while reproduction is seen as the basis of social control. The tension between these two systems is a key aspect of socialist-feminist thought.
"DECLINE"

"What describe the world? A process by which change occurs?" a society know the natural

its most useful for this approach to history are evolution, reproduction, and the relations among animals (humans), plants, minerals, and humans constitute the ecological particular habitat at a particular time. Through production (the processing, and exchange of resources or profit), human beings have a direct and immediate relationship to non-human nature. Humans, both biological and social, are evolved from immediate impact. The effects of the biological reality of human beings are mediated by cultural forms of production (hunting, subsistence agricultural capitalism, and so on). This does not mean that the land and its directness, but on the two steps removed from immediacy: on the habitat are the modes in which a society knows and external world—science, religion, ideas. Ideas must be translated into economic actions in order to affect human world... Production and production (Engels in his Origin of Private Property, and the State: determining factors in history at work, the production and reproduction or immediate life... this itself old character. On one hand, ideas of the means of subsistence other, the production of human selves. The reproduction of the means is thus distinct from, but related to, the production of subsistence. A change in the mode of production from gathering-hunting to subsistence-oriented agriculture, or from subsistence agriculture to capitalist agriculture, will increase the capacity of the land to feed people. Intensification of agricultural production is made possible through advances in science and technology.

Production and reproduction interact dialectically. When reproductive patterns are altered, as in population growth or changes in property inheritance, production is affected. Conversely, when production changes, as in the addition or depletion of resources or in technological innovation, social reproduction and biological reproduction are altered. A dramatic change at the level of either reproduction or production can alter the dynamics between them, resulting in a major transformation of the social whole. Whereas the colonial ecological revolution in New England resulted from external impacts wrought by Europeans on Indian production and reproduction, the capitalist ecological revolution was initiated by internal tensions between production and reproduction. Because of the colonists' low person-land ratio, each family had to reproduce its own labor force in order to produce subsistence for the family. On the other hand, a patriarchal system of父权 inheritance meant that farm sizes decreased over three or four generations to the point that not all sons could inherit enough land to reproduce the subsistence system. The tensions between the requirements of subsistence-oriented production (a large family labor force) and social reproduction through patrilineal inheritance (all sons must inherit farms) helped to create a wage labor supply of landless sons needed for the transition to capitalist agriculture.

Socialist-feminists have further elaborated the interaction between production and reproduction. In her 1976 article, "The Dialectics of Production and Reproduction in History," Renate Bridenthal argues that changes in production give rise to changes in reproduction, creating tensions between them. For example, the change from a preindustrial agrarian to an industrial capitalist economy that characterized the capitalist ecological revolution can be described with respect to tensions, contradictions, and synthesis within the gender roles associated with production and reproduction. In the agrarian economy of colonial America, production and reproduction were symbiotic: women participated in both spheres, since the production and reproduction of daily life were centered in the household and domestic communities. Likewise, children were socialized into production by men working in barns and fields and by women working in farmyards and farmhouses. But with industrialization, production of items such as textiles and shoes moved out of the home into the factory, while farms themselves became specialized and mechanized. Unmarried women were employed outside the home in textile production, or later in clerical work, while married women focused more of their efforts on the reproduction of daily life through housework. Production became more public, reproduction more private, leading to their social and structural separation. For working-class women, the split between production and reproduction imposed a double burden of wage labor and housework, while for middle-class women it led to an increase in domesticity and indoor housework.

Ecological revolutions are generated through tensions and interactions between production and ecology and between production and reproduction. Changes may be externally stimulated as in the colonial ecological revolution or internally stimulated (and aided by external market incentives) as in the capitalist ecological revolution. As society responds to change, inherent tensions in its legitimating worldview and
forms of consciousness begin to widen. Some assumptions about nature are elaborated and developed to support and lead the new directions; others are rejected as irrelevant and become the ideas of subordinate groups.

**Consciousness**

Consciousness is the totality of one's thoughts, feelings, and impressions, the awareness of one's acts and volitions. Group consciousness is a collective awareness by an aggregate of individuals. Individual consciousness and group consciousness are shaped by both environment and culture. In different historical epochs, a society's consciousness is dominated by particular characteristics. These forms of consciousness, thorough which the world is perceived, understood, and interpreted, are socially constructed and subject to change.

A society's symbols and images of nature express its collective consciousness. They appear in mythology, cosmology, science, religion, philosophy, language, and art. Scientific, philosophical, and literary texts are sources of the ideas and images used by controlling elites, while rituals, festivals, songs, and myths provide clues to the consciousness of ordinary people. How are the ideas, images, and metaphors that legitimate human behaviors toward nature translated into ethics, morals, and taboos? Anthropologist Clifford Geertz holds that religious beliefs establish powerful moods and motivations that translate into social behaviors. Also, ideological frameworks or worldviews "accrete" behavioral norms. According to Charles Taylor, particular frame works give rise to a certain range of normative variations and not others because their related values are not accidental. When sufficiently powerful, worldview and their associated values can override social changes, but if weak or weakened they can be undermined. A tribe of New England Indians or a community of colonial Americans may have a religious worldview that holds it together for many decades while its economy is gradually changing. Eventually, however, with the acceleration of commercial change, ideas that had formerly existed on the periphery or among selected elites may become dominant if they support and legitimate the new economic directions.

For Native American cultures, consciousness was an integration of all the senses with the body in sustaining life. In this mimetic consciousness, culture was transmitted intergenerationally through imitation in song, myth, dance, sport, gathering, hunting, and planting. Oral-aural transmission of tribal knowledge through myth and transactions between animals, Indians, and neighboring tribes produced sustainable relations between the human and the nonhuman worlds. The primal gaze of looking eyes between hunter and hunted initiated the moment of ordained killing when the animal gave itself up so that the Indian could survive. The very meaning of the gaze stems from the intent look of expectancy when a deer first sees a fire, smells a scent, or looks into the eyes of a pursuing hunter. For Indians engaged in an intimate survival relationship with nature, sight, smell, sound, taste, and touch were all of equal importance, integrated together in a total participatory consciousness.

When Europeans took over Native American habitats during the colonial ecological revolution, vision became dominant within the mimetic fabric. Although daily life for most colonial settlers, as for Indians, was still guided by imitative, oral, face-to-face transactions, Puritan eyes turned upward toward a transcendent God who sent down His Word in written form in the Bible. Individual Protestants learned to read so that they could interpret God's word for themselves. In turn, the biblical word legitimated the imposition and artifact in the new temporal gaze of the Indian was su the objectifying scrutiny of fur merchant, and banker who ture as resource and commod and property relations that ex from Indians were codified in phanmomic literacy became ce gious expression, social surviv ward mobility.

The imposition of a visual consciousness by Puritans was to the continuance of Indian ways of life. The implications to the loss of mimetic cosmology of Plato's Greece. According to Eric Havelock, Plato's critique of the orator to Plato (as to the Puritan) was an imitator in extremes: extending even and cries of animals. The orator was not the creative, individual human responses, who repeated by rote man's song, poem, or myth was not with a unique psyche, but a versus. No "I" stood apart from consciousness to examine or spell. No "self" asserted its own sense and authority. For Platonism of the autonomous psyche the separation of the known, the subject from the object analytical from the oral.

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The imposition of a visually oriented
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in Plato's Greece. According to philoso-
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mimetic heritage of Homer was devastat-
ing. The orator to Plato (as the shaman to
the Puritan) was an imitator who indulged
in extremes extending even to the howls
and cries of animals. The oral tradition
was not the creative, individualistic me-
dium appropriate to the virtuous, but the
distortive chicanery of the trickster who
presented appearance as reality. Myth and
poetry stood for the illusions of appear-
ance, not the truths discernible to reason.
The oral tradition was merely a catalog of
repeated, remembered examples that pre-
determined human responses. The person
who repeated by rote memory through
song, poem, or myth was not an individual
with a unique psyche, but a victim of hyp-
nosis. No "I" stood apart from the collective
consciousness to examine or criticize its
spell. No "self" asserted its own indepen-
dence and authority. For Plato, the emer-
gence of the autonomous psyche signified
the separation of the knower from the
known, the subject from the object, and
the analytical from the oral.

Against poetry, Plato set his theory of
pure forms, with mathematics as the ex-
emplar par excellence of knowledge. The
ideal forms of the triangle, the bed, and
the good were exact, unchanging, and uni-
versal. The applied mathematician, the
artisan, and the philosopher attempted
to copy these forms in matter, while the or-
ator and the poet were content with word
pictures. Mathematics, logic, and science,
or epistemology, were the true modes of know-
ning, and the self was the knowing subject.
With the commercialization of the fur
trade and the missionary efforts of Jesuits
and Puritans, a society in which animals,
plants, and rocks were equal subjects
to ordering dominated by transcendent
vision in which individual human subjects
were separate from resource objects. This
change in consciousness imposed by domi-
nant elites characterized the colonial eco-
logical revolution.

The rise of an analytic, quantitative con-
sciousness was a feature of the capitalist
ecological revolution. Capitalist ecological
relations emphasized efficient manage-
ment and control of nature. With the de-
velopment of mechanistic science and its
use of perspective diagrams, visualization
was integrated with numbering. The print-
ing press and perspective art linked the
mental to the material through what soci-
ologist of science Bruno Latour called
"immutable mobiles." By reducing three-
dimensional natural objects—oceans,
rivers, beasts, birds, rocks, and trees—to
two-dimensional inscriptions—maps, charts,
drawings, diagrams, lists, graphs, curves,
equations, papercuts, texts, files, and archives
—quantitative features could be circulated
unchanged. In a laboratory, observatory, or
field station, they could be accumulated,
arayed, superimposed, compared, and re-
constructed as a "natural" order. The re-
sult," observed Latour, "is that we can
work on paper with rulers and numbers,
but still manipulate three-dimensional ob-
jects 'out there'. . . . Distant or foreign
places and times [can] be gathered in one
place in a form that allows all the places
and times to be presented at once." The
visual and material thus combined to produce power over nature through science. The capitalist ecological revolution was characterized by the superposition of scientific, quantitative approaches to nature and its resources. Through education analytic consciousness expanded beyond that of dominant elites to include most ordinary New Englanders.

Forms of consciousness are power structures. When one worldview is challenged and replaced by another during a scientific or ecological revolution, power over society, nature, and space is at stake. Symbol systems, metaphors, and images express the implicit ethics of elites in positions of social power. Debates over scientific theories, argues historian of science Donna Haraway, are contests for power over the terms of discourse. According to French philosopher Michel Foucault, the history of power over nature is a history of spaces, spatial metaphors (habitat, soil, landscape, topography, terrain, region, and so on), strategies of control, and modes of mapping, tabulation, recordation, classification, demarcation, and ordering. Whereas space “used to belong to nature,” when mapped by explorers and geographers, cataloged and inventoried by traders and naturalists, and coded by militarists and computer scientists, it can be controlled by an “eye of power” and subjected to unbounded surveillance. For Foucault, the vision obtained metaphorically through Jeremy Bentham’s Panopticon, in which the radiating wings of an entire prison can be surveyed from a single central tower, is paradigmatic of the controlling scrutiny of the overseer. All things are made visible through the dominating, examining look of a cultural overseer located in a management center that controls not only social institutions, but also by extension nature, resources, national parks, wild rivers, endangered whales, herds of wild antelope, migrating warblers, and indeed the whole earth itself through satellite surveillance.

Human consciousness socially constructs nature in different ways in different historical epochs and cultures. Humans negotiate “reality” with nonhuman nature. Indians constructed nature as a society of equal face-to-face subjects. Animals, plants, and rocks were alive and could be communicated with directly. For eighteenth-century New England farmers, nature was an animate mother carrying out God’s dictates in the mundane world. Plants and even rocks grew on the earth’s surface, but were created for human use and could be harvested as commodities. Nineteenth-century scientists, industrialists, and market farmers reconstructed them as scientific objects to be analyzed in the laboratory and as natural resources to be extracted for profit.

Ecological thinking constructs nature as an active partner. The “nature” that science claims to represent is active, unstable, and constantly changing. As parts of the whole, humans have the power to alter the networks in which they are embedded. Nature as active partner acquires human interventions through resilience and adaptation or “resists” human actions through mutation and evolution. Nonhuman nature is an actor; human and nonhuman interactions constitute the drama. Viewed as a social construction, nature as it was conceptualized in each social epoch (Indian, colonial, and capitalist) is not some ultimate truth that was gradually discovered through the scientific processes of observation, experiment, and mathematics. Rather, it was a relative changing structure of human representations of “reality.”

Ecological revolutions, I argue, are processes through which different societies change their relationship to nature. They arise from tensions between production and ecology and between production and reproduction. The results are new constructions of nature, both maintained in human consciousness.

10. EPILOGUE: THE GLOBAL ECOLOGICAL REVOLUTION

Twentieth-century New England product of the colonial and capitalist revolutions. Its Native American Indians reduced to small but resilient communities that have adapted to culture while retaining many traditions. The region is deeply embittered by interconnected modern world by capitalist forms of production, and consciousness. As a global ecological network, it is the availability of scarce resources. It is an integral part of the Capitalist Core economies on peripheral Third World economies and cheap labor.

Most of the energy, food, and needed to sustain the lives of New Englanders come from external sources. Roughly 80 percent of its meat and fruit are imported from outside the region. The availability and the are affected by transportation, midwestern droughts. Energy imported oil and gas, augment burning stoves and some local nuclear energy. Energy availability is subject to global shortages and tensions. Clothing is largely imported from southern and foreign textile sources at lower labor costs. In the country as a whole, fast food prepared from imported beef, Central and South America at the expense of tropical rain forests and sea grasses.

This dependence outside has moved some types of environmentalism beyond New England's
through satellite surveillance. Consciousness socially constructs rent ways in different historical cultures. Humans negotiate with nonhuman nature. In some cultures, animals, plants, and human use and could be commodified. For eighteenth-century farmers, nature was an entity carrying out God's dictate on the earth's surface, but this natural world could be commodified. Nineteenth-century industrialists, and market systems, it was a scientific object analyzed in the laboratory and resources to be extracted over centuries. The “nature” that scientists represent is active, unconstantly changing. As parts of humans, the power to work in which they are engaged as active partners acquiring resources through reflection or “resists” human nature and evolution. In an act of human and interactions constitute the life as a social construction, a post-humanist perspective (a colonialist, and capitalist) is mate truth that was gradually through the scientific preservation, experiment, and record. Rather, it was a relative act of human representation.

Evolution, I argue, are phases which different societies use to negotiate with nature. They anticipate between production and between production and consumption. The results are new constructions of nature, both materially and in human consciousness.

10. EPILOGUE: THE GLOBAL ECOLOGICAL REVOLUTION

Twentieth-century New England is a product of the colonial and capitalist ecological revolutions. Its Native Americans have been reduced to small but resilient communities that have adapted to mainstream culture while retaining many tribal traditions. The region is deeply embedded in an interconnected modern world structured by capitalist forms of production, reproduction, and consciousness. As a member of a global ecological network, it is affected by the availability and scarcity of natural resources. It is an integral part of the Western capitalist core economies that depend on peripheral Third World economies for resources and cheap labor.

Most of the energy, food, and clothing needed to sustain the lives of New Englanders come from external markets. Roughly 80 percent of its meat, vegetables, and fruit are imported from outside the region. The availability and the cost of food are affected by transportation strikes and midwestern droughts. Energy comes from imported oil and gas, augmented by wood-burning stoves and some locally generated nuclear energy. Energy availability is subject to global shortages and price variations. Clothing is largely imported from southern and foreign textile mills, where wage labor is cheaper and supplemented by local and cottage clothing industries. As in the country as a whole, fast food is often prepared from imported beef raised in Central and South America at the expense of tropical rain forests and served in styrofoam containers at the expense of the global ozone layer.

This dependence on outside markets has moved some types of environmental degradation beyond New England's boundaries, allowing portions of its own environment to recover. The twentieth-century decline in farming and the changeover to oil have resulted in the regrowth of the New England forest. Eighty percent of the land is once again forested, close enough to the 95 percent on the eve of colonization to provide a sense of how the original forest (minus its largest giants) might have looked. Maine, New Hampshire, and Vermont are among the four most heavily forested states in the nation. Sixty-two percent of New England's forested acreage, however, is held in small parcels by individuals, most of whom own less than fifty acres, and many of whom are urbanites with country retreats who are conscious of environmental preservation. The lumber industry owns only 32 percent of this acreage; the remaining 6 percent is public land. Major public policy issues are involved in deciding how the forests should best be used.

Yet this regenerated forest is itself the victim of industrial capitalism. Acid precipitation from the smokestacks of the East and Midwest has attacked New England's crops, trees, and shrubs. Acid rain leaches nutrients from leaves, makes plants more vulnerable to fungal and bacterial infections, and reduces tree seedlings and plant productivity. Between 700 and 1,400 wild species are thought to suffer from sulfur dioxide and ozone emissions. The effects are most visible in higher-elevation coniferous forests, but the damage is universal. Acid rain has raised the acidity of thousands of lakes all over New England and introduced mercury, cadmium, and lead into their ecosystems. With the reduction of zooplankton, phytoplankton, and mollusks, fish populations have declined, along with waterfowl such as herons, ducks, loons, and ospreys.

The growth of high technology and computer-based industries further connects New England to the rest of the planet, al-
toring human perceptions of the earth. The Computer Age has mapped the earth's surface as a grid of Cartesian coordinates bounded by and enclosed within a communications network. Today, the "whole earth" image from a satellite's eye view is no longer an earth apple, but a two-dimensional photograph. Viewed from afar by the spectator, it has become a NATO object detached from human participation. Computer advertisements and popular media depict the earth variously as electronically wired; encircled by floating cars, calculators, and computers; enclosed within laboratory flasks; squeezed by human hands and lemon juicers; and dominated by oversized white males standing on its surface. The symbols of nature that permeate and structure modern consciousness present a mechanized, artificial, instrumental nature. It has become completely mechanical, having lost any semblance of organic life.

The adoption of the mechanistic paradigm throughout the Western world has implications that extend far beyond New England's borders. Based on the mechanistic model, capitalist agriculture over the whole globe has moved increasingly in the direction of artificial ecosystems, built on simplified monocultures that are vulnerable to pest outbreaks and catastrophic collapse. Identical rectangular and circular fields precisely laid out for efficient cultivation, irrigation, and harvesting replicate atomic and latticelike patterns, replacing the diversity of small, haphazard patchworks of fields within forests. Stimulated by urbanization and industrialization, agriculture has developed more efficient machines, genetically "improved" strains of crops and animals, artificial fertilizers, and chemical pesticides. The external energy needed to produce the chemicals, operate the farm machinery, and process, store, and transport the products often surpasses the calories the foods themselves supply. Most of this external energy comes from fossil fuels by way of industrial systems rather than from the sun by way of photosynthesis.

Eccological thinking, however, offers the possibility of a new relationship between humans and nonhuman nature that could lead to the sustainability of the biosphere in the future. The assumptions of the ecological paradigm contrast with those of the mechanistic, resting on a different set of assumptions about nature: (1) everything is connected to everything else in an integrated web; (2) the whole is greater than the sum of the parts; (3) nonhuman nature is active, dynamic, and responsive to human actions; (4) process, not parts, is primary; and (5) people and nature are a unified whole.

Ecology also offers a new ethic for grounding human relations with nature. Mechanism is consistent with a homocentric ethic of "natural rights" in which each individual uses nonhuman nature to maximize his or her self-interest. An ego-centric ethic, however, is based on a network of mutual obligations rather than natural rights, and on values that are based on the ecosystem rather than on human interests. The land ethic of ecologist Aldo Leopold (1949) enlarges the boundaries of the community to include "soils, waters, plants, and animals, or collectively, the land." "A thing is right," according to Leopold, "when it tends to preserve the integrity, beauty, and stability of the biotic community. It is wrong when it tends otherwise."

Although much of scientific ecology has appropriated the reductionist approach of the mechanistic model, human ecology includes human beings as part of the natural world and recognizes their ability both to destroy as well as to live within the limits of local ecosystems. But for an ecological model to replace mechanism as the dominant paradigm for decision making would require not merely an intellectual, but a global, social, and economic revolution.

The capitalist relations of production and the patriarchal relations of reproduction which support mechanistic co would have to give way to new forms, new gender roles, and an ecological ethic.

Nevertheless, the possibility of such a global ecological revolt occurring. A global ecological transition transcends national boundaries for a transition to a sustainable Global resource depletion has appeared at the intersection of industrial society, agriculture, and ecology. Nuclear war and power plant accidents threaten with radioactivity, cancer-causing. The burning of fossil fuels for cheap energy increases carbon dioxide in the atmosphere, while the cutting of rainforests for grazing and conversion to oxygen, global warming and melting ice, "greenhouse effect" that threatens to destroy aquatic life. Industrial plastics pollute oceans. As chlorofluorocarbons (CFCS) are released into the atmosphere, the earth's protective ozone layer is threatened. Toxic wastes from industries enter ground water, threatening human health. Acid rain falls from the air, destroying the earth's protective layer of ozone.

Habitat destruction from industrial activities endangers hundreds of species around the whole globe. Other disruptions are occurring. Urbanization is proceeding at an exponential rate, with changing population densities in developed nations. Populations in developing countries, on the other hand, are expanding at a rate that is unsustainable.
The capitalist relations of production and the patriarchal relations of reproduction that support mechanistic consciousness would have to give way to new socioeconomic forms, new gender relationships, and an ecological ethic.

Nevertheless, the possibility exists that such a global ecological revolution may be occurring. A global ecological crisis that transcends national boundaries could trigger a transition to a sustainable earth. Global resource depletion and pollution have appeared at the intersection of capitalist (as well as Soviet) economic production and ecology. Nuclear war and nuclear power plant accidents threaten the earth with radioactive, cancer-causing emissions. The burning of fossil fuels for industrial production increases carbon dioxide in the atmosphere, while the cutting of tropical rain forests for grazing and crops reduces its conversion to oxygen, resulting in global warming and melting ice caps. This “greenhouse effect” alters weather patterns that affect agriculture, fishing, and the ecology of local habitats. Nondegradable industrial plastics pollute soils and oceans. As chlorofluorocarbons are produced for refrigerants and styrofoam packaging, the earth’s protective ozone layer is threatened. Toxic wastes from chemical industries enter ground water supplies, threatening human health. Acid rain from coal-burning “smokestack” industries crosses national boundaries, increasing the acidity of lakes and damaging forests. Habitat destruction from industrial expansion endangers hundreds of indigenous species around the whole globe.

Other disjunctions are occurring at the intersection of production and reproduction. Global population continues to grow exponentially despite declining reproductive rates in developed nations. Increased populations in developing countries put pressure on local economies and consequently on the land. Such pressures challenge traditional sex-gender roles and create new patterns in both production and biological reproduction. The emergence of worldwide “green” political parties is in part a response to the failure of the legal-political frameworks that reproduce capitalist society to regulate pollution and depletion. These tensions within production and reproduction are experienced as threats to the health and survival of both human and nonhuman nature.

The outcome of this global ecological crisis in production and reproduction could be negative or positive. A pessimistic scenario would be the crisis and collapse predicted by the “limits to growth” models of the 1970s and the Malthusian dilemma of exponential population growth outrunning the food supply. A positive outcome, however, could be the crisis and reorganization implied by the “order out of chaos” approaches of Ilya Prigogine and Erich Jantsch, moving the entire globe toward ecological and economic sustainability in the twenty-first century. New forms of production, reproduction, and consciousness could structure the world differently for twenty-first century citizens.

The transition to a sustainable world would entail changes in production and reproduction that emphasize ecodevelopment in both developed and developing countries. Colonial and capitalist forms of exploitation of nature and Third World peoples would give way to priorities that fulfill subsistence and quality-of-life needs. These would be enhanced by global efforts to conserve energy and renewable natural resources, recycle nonrenewable resources, and adopt appropriate technologies. Ecological and economic development, if sensitively structured by the developing countries themselves, could pave the way to the demographic transition that has lowered reproductive rates in developed countries. Changes in production would thus support changes in reproduction and both together.
would alleviate human pressures on the global ecosystem. This transition would be legitimated by changes in values and in ways that people perceive, know, and structure reality.

Supporting the emergence of a transformation of consciousness are calls by physicists, ecologists, feminists, poets, and philosophers for philosophical changes that would reintegrate culture with nature, mind with body, and male with female modes of experiencing and representing “reality.” They suggest that nature as actor may now be breaking out of the mechanistic straitjacket in which human representations have confined it for the past three hundred years. Through the social construction of a new reality, future generations may learn a worldview that is nonmechanistic. When philosopher Max Stirner, writing in 1844, called for the revolt of nature, he invited it to speak in a language other than instrumentalist.

“Once it was the endeavor of art, literature, and philosophy to express the meaning of things and of life, to be the voice of all that is dumb, to endow nature with an organ for making known her sufferings, or we might say, to call reality by its rightful name. Today nature’s tongue is taken away. Once it was thought that each utterance, word, cry, or gesture had an intrinsic meaning; today it is merely an occurrence.”

The voice with which nature speaks and is heard by humans is tactile, sensual, auditory, odoriferous, and visual—not disembodied reason, but visceral understanding.

“In the present crisis,” Horkheimer continued, “the problem of mimesis is particularly urgent. Civilization starts with, but must eventually transcend and transcendulate, man’s native mimetic impulses. . . . Conscious adaptation and eventually domination replace the various forms of mimesis . . . the formula supplants the image, the calculating machine the ritual dances.”

To survive we must once again recover the meaning of mimesis, actively making ourselves “like” the environment, not as object, but in the deepest sense of visceral remerging with the earth.

Emerging from concerns over the earth’s future is a spectrum of new sciences infused with an ecological perspective. At their root is mimesis in a new form—integrative thinking. Imitation, synthesis, and creative reciprocity between humans and nonhuman nature constitute a form of consciousness in which tacit knowing through the body and information networks (“mind”) in nature links humans to the nonhuman world. The new theoretical frameworks challenge positivist epistemology through participatory forms of consciousness. Gregory Bateson’s “ecology of mind” sees nature as a network of information moving from brain to hand to stick to rock to earth to eye to brain. “Mind” in nature integrates human subject and active object into a larger network of energy and information exchange. Nature is a changing whole consisting of interactions and processes interpreted by humans. The body’s tacit knowledge is one with the mind.

Philosophers have proposed alternatives to the mechanistic framework based on nature’s inherent activity, self-organization, permeable boundaries, and resilience. Deep ecologists argue that reform environmentalism is insufficient to deal with the magnitude of global environmental problems. They call for a fundamental transformation in Western epistemology, ontology, and ethics. Deep ecology represents a change from a mechanistic to an ecological consciousness rooted in biospecies equality, appropriate technologies, recycling, and bioregions as ecological homes. The new philosophy is infused with an environmental ethic oriented toward establishing sustainable relations with nature.

Structural changes within science itself may also be indicative of the emergence of a new paradigm. The new physics of Bohm contrasts the older world picture with the notion of holomovement. His cosmology is the primacy of process rather than domination of parts. The Gaia hypothesis poses that the earth’s biota as a complex self-regulating (cybernetic) system controls the functioning of the chemical cycles. Chaos theory offers tools for describing instability and turbulence consistent with that nature as actor offers surpluses of catastrophes that cannot be predicted linearly and mechanistically.

Coupled with these changes in epistemology and ethics are new sciences oriented toward effecting action to ecological sustainability. Agroecology is the active reconstruction of ecosystems (such as prairies, grasslands, and lakes). By studying a wide range of patterns, the wisecent in evolution can be re-created than taking nature apart and in ecosystems, as the past three centuries of mechanistic science have taught. Agroecology is supremely well, restorationists are putting it back together. Rather than taking nature apart and controlling it, restorationists are HEAF the for the sake of living in a more biologically rich world.

Agroecology looks back to traditional community and mimics its patterns. Traditional farming—designs of trial and error through local knowledge and the transfer of successful adaptations from farm to farm.
mimicry, actively making our-" the environment, not as ob- the deepest sense of visceral with the earth.

from concerns over the earth's spectrum of new sciences in an ecological perspective. At mimetic in a new form — inte- ming. Imitation, synthesis, and reciprocity between humans and nature constitute a form of con- which tacit knowing through and information networks nature links humans to the world. The new theoretical challenge positivist epistemol- participatory forms of con- Gregory Bateson's "ecology of nature as a network of information from brain to hand to stick to h to eye to brain. "Mind" in nat- izes human subject and active a larger network of energy and exchange. Nature is a chang- consisting of interactions and interpreted by humans. The knowledge is one with the others have proposed alternatives anistic framework based on na- cent activity, self-organization, boundaries, and resilience.ists argue that reform environ- is insufficient to deal with the global environmental prob- call for a fundamental transfor- Western epistemology, ontology. Deep ecology represents a mechanistic to an ecological es rooted in biospecies equality, technologies, recycling, and as ecological homes. The now is infused with an environment- tended toward establishing sus- tains with nature.

d changes within science itself indicative of the emergence of a new paradigm. The new physics of David Bohm contrasts the older world picture of atomic fragmentation with a new philosophy of wholeness expressed in the unfolding and enfolding of moments within a "holomovement." His cosmology is one of the primacy of process rather than the domination of parts. The Gaia hypothesis of British chemist James Lovelock proposes that the earth's biota as a whole maintain an optimal chemical composition within the atmosphere and oceans that support its life. Gaia, the name of the Greek earth goddess, is a metaphor for a self-regulating (cybernetic) system that controls the functioning of the earth's chemical cycles. Chaos theory in mathematics offers tools for describing complexity and turbulence consistent with the idea that nature as actor offers surprises and catastrophes that cannot be predicted by linear equations and mechanic descriptions.

Coupled with these changes in science, epistemology, and ethics are new applied sciences oriented toward effecting a transition to ecological sustainability. Restoration is the active reconstruction of pristine ecosystems (such as prairies, grasslands, rivers, and lakes). By studying and mimicking natural patterns, the wisdom inherent in evolution can be re-created. Rather than taking nature apart and simplifying ecosystems, as the past three centuries of mechanistic science have taught us to do supremely well, restorationists are actively putting it back together. Rather than analyzing nature for the sake of dominating and controlling it, restorationists are synthesizing it for the sake of living symbiotically within the whole.

Agroecology looks back to traditional agriculture and mimics its polycultural patterns. Traditional farming — developed over generations of trial and error through deep local knowledge and the transmission of successful adaptations from fathers and mothers to sons and daughters — is joined with an understanding of local ecology. The polycultures of traditional farmers often are more productive, are more resistant to pests, and use better-adapted varieties of crops than are monocultures of imported seed supported with herbicides and artificial fertilizers. In designing agroecosystems, the spatial arrangements and seasonal development of wild plant species are used as models. Arrangements of local species of grasses, vines, shrubs, and trees are simulated in designing integrated cereal, vegetable, fruit, and tree crop systems. Similarly, agroforestry restores the complementary arrangements of trees, crops, and animals in combination with ecological principles in order to maintain productivity without environmental degradation. Orchards planted with ground covers of legumes or berries and foraged by poultry, pigs, and bees keep down pests and produce well-mulched and manured soil.

The biological control of insects also uses natural ecosystems as models. Uncultivated land surrounding fields harbors birds and insect enemies as well as pests. Flowers along roadsides and fences are especially attractive to beneficial insects. Diversity in crops and surroundings and arrangements of beneficial plants mimic natural conditions, making crops less visible to insect enemies and acting as barriers to pest dispersal. By imitating nature, agricultural systems can be designed that both suppress pests and maximize total yield.

A global ecological revolution would also reconstruct gender relations between women and men and between humans and nature. The domination of women and nature inherent in the market economy's use of both as resources would be restructured. Both radical and socialist feminist theories present alternatives to patriarchal and capitalist ecological relations. But while radical feminism has delved more deeply
into the woman-nature connection, socialist feminism is more consistent with the concept of the social construction of ecological revolutions.

For radical feminists and ecofeminists, human nature is grounded in human biology. Humans are biologically sexed and socially gendered. Sex-gender relations give men and women different power bases; hence the personal is political. The ontology and epistemology of the mechanistic worldview are deeply masculinist and exploitative of nature, which has historically been characterized in the male gender. Male-designed and produced technologies neglect the effects of nuclear radiation, pesticides, hazardous wastes, and household chemicals on women’s reproductive organs and on the ecosystem. Often stemming from an antiscience, antitechnology standpoint, radical feminism celebrates the relationship between women and nature through the revival of ancient rituals centered on goddess worship, the moon, animals, and the female reproductive system. Its philosophy embraces intuition, an ethic of caring, and weblike human-nature relationships. Yet in emphasizing the female, body, and nature components of the dualities male/female, mind/body, and culture/nature, radical feminism runs the risk of perpetuating the very value hierarchies it seeks to overthrow.

Socialist feminism and socialist ecofeminism incorporate many of the insights of radical feminism, but view both knowledge and reality as historically and socially constructed. What counts as human nature is the product of historically changing interactions between humans and nature, men and women, social classes, races, ages, and national origins. Like Marxist feminists, socialist feminists see nonhuman nature as the material basis of human life, supplying the necessities of food, clothing, shelter, and energy. Nature is transformed by human science and technology for use by all humans for survival. Any meaningful analysis must be grounded in an understanding of power in both the personal and political spheres. Like radical feminism, socialist feminism is critical of mechanistic science’s treatment of nature as passive and its male-dominated power structures. It deplores the omission of women’s reproductive roles and gender analysis in history and would give reproduction a central place in theory construction. Socialist feminism views change as dynamic, interactive, and dialectical, rather than linear or incremental. Although as yet socialist feminism has had little to say about ecology, it is compatible with a view of nonhuman nature as a historical actor, with the ecological goal of developing sustainable, non-dominating relations with nature.

An ecological transformation in the deepest sense entails changes in ecology, production, reproduction, and forms of consciousness. Ecology as a new worldview could help resolve environmental problems rooted in the industrial-mechanistic mode of representing nature. In opposition to the subject/object, mind/body, and culture/nature dichotomies of mechanistic science, ecological consciousness sees complexity and process as including both culture and nature. In the ecological model, humans are neither helpless victims nor arrogant dominators of nature, but active participants in the destiny of the webs of which they are a part.

Although many changes leading to a healthier, sustainable biosphere seem to be occurring, the forces that encourage the current patterns of global resource depletion and pollution are very strong. Patriarchy, capitalism, and the domination of nature are deeply entrenched and function to maintain the present direction of development. Yet one may hope that a sustainable global environment, society, and ethic will emerge in the twenty-first century.

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GLENN C. LOURY

Glenn C. Loury (b. 1948) is a prominent social critic whose current appointment is as professor of African-American studies at Harvard University. He is the author of many books and articles on issues involving African Americans in the United States.

The excerpt here was given as a lecture at the University of New Mexico in 1990, as part of a series of lectures by African American scholars on the challenges faced by African Americans in the United States. It addresses the impact of race on the American civil rights movement.

Achieving the “Dream”: A Call to Action in the Spirit of Martin Luther King Jr.

Therefore, since we are surrounded by a great cloud of witnesses, let us throw off everything that hinders, and the sin that so easily entangles, and let us run with perseverance the race marked out for us (Hebrews 12:1, NIV).

The struggle for freedom and equality is the central theme in the black A