Radical Ecology

The Search for a Livable World

Second Edition

Carolyn Merchant

Revolutionary Thought and Radical Movements

Radical Ecology

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Radical Movements

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CAROLYN MERCHANT

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To the Earth

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SERIES EDITOR'S PREFACE

This book, like its companions in the *Revolutionary Thought/Radical Movements* series, challenges contemporary society and civilization.

Perhaps the heart of this challenge is a deeply felt anguish and outrage over the sheet magnitude of human suffering—along with the terrible frustration of knowing that much of this suffering could be avoided. Radicals refuse to blame homelessness and starvation, the rape of women and abuse of children, the theft of labor and land, hope and self-respect on divine Providence or unchangeable human nature. Rather, they believe that much of it comes from injustice, exploitation, violence, and organized cruelty that can be eradicated. If we drastically alter our arrangements in the direction of equality, justice, and human fulfillment, the brutal realities of the present can give way to vastly increased material security, social harmony, and self-realization.

Philanthropists and political reformers share radicals' concern for human suffering. But unlike reformers and philanthropists, radicals and revolutionaries address whole *systems* of injustice. In these systems, particular groups are humiliated, denied rights, subject to unjust control. The few become rich while the many suffer from poverty or economic insecurity. The select get privileges while millions learn submission or humiliation. We are conditioned to false needs for endless consumption while nature is poisoned. The powers-that-be profit from these systems, "common sense" enshrines them as necessary, and ideological mystification obscures their origin and nature by blaming the victims. Responses to people's pain, if they are to be truly and lastingly effective, must be aimed *at the system:* at capitalism, sexism, racism, imperialism, homophobia, the bureaucratic state, and the domination of nature.

Governments and economies, families and culture, science and individual psychology—all are shaped by these systems of domination and exclusion. That is why the radical ideal goes beyond piecemeal improvements to a Utopian vision; and tries to realize that vision in everyday struggles for a fair distribution of power, human dignity, and a livable environment. Revolutionaries have argued that a modern economy can be democratically controlled and oriented to human needs rather than profit; can do without vast differences of wealth and power; and can preserve rather than destroy the earth. Radicals claim that in a true 'democracy' ordinary men and women would help shape the basic conditions which affect their lives: not just by an occasional trip to the ballot box, but by active involvement in decisions about political and economic life.

How will these sweeping changes take place? Revolutionaries have offered many answers—from large political parties to angry uprisings, from decentralized groups based in consciousness-raising to international organizations. In any case, however, the conception of radicalism which informs the series stipulates that authentic revolutionary change requires the self-action of sizable groups of people, not the self-promotion of a self-proclaimed revolutionary "elite." The only way to prevent the betrayal of the revolution by a privileged bureaucracy is to base radical politics on free discussion, mutual respect, and collective empowerment *from the beginning*. This is one of the clearest and most painful lessons from the history of communism.

Of course much of this sounds good on paper. Yet it may be—as many have claimed—that radical visions are really unrealistic fantasies. However, if we abandon these visions we also abandon human life to its current misery, with little to hope for but token reforms. Radicals reject this essentially cynical "realism," opting for a continuing faith in the human capacity for a fundamentally different and profoundly liberating form of life.

In fact, people have always dreamed of a better world. Yet it is only since the late eighteenth century that organized groups developed a systematic theoretical critique of social life; and tried to embody that critique in mass political movements designed to overthrow the existing order of economic ownership and political control. American revolutionaries claimed that "All men are endowed with certain inalienable rights." The French revolution demanded "liberty, equality, fraternity."

Since then Marxist, socialist, feminist, national liberation, civil rights, gay and lesbian liberation, and ecology movements have been born. Each move-

ment utilized some of the accomplishments of its predecessors, criticized the past for its limitations, and broke new ground. *Revolutionary Thought/Radical Movements* will focus on the theory and practice, successes and failures, of these movements.

While the series' authors are part of the radical tradition, we are painfully aware that this tradition has committed grave errors and at times failed completely. The communism of the Eastern bloc, while maintaining certain valuable social welfare programs, combined economic inefficiency, brutal tyranny, and ecological devastation. Many of us who took to the streets in the 1960s joined arrogance with idealism, self-indulgence with utopian hopes. Much of contemporary radical or socialist feminism fails to reach beyond a circle of the already converted.

These and other failures are certainly apparent today. Daily headlines trumpet the collapse of the Eastern bloc, the US victory in the Cold War, the eternal superiority of capitalism and free markets, and the transformation of yesterday's radicals into today's yuppies. Governments of countries that had called themselves "socialist" or "communist" (however much they were distorting the meaning of these terms) trip over each other rushing west for foreign corporate investment and economic advice.

But there are also *successes,* ways in which radicals have changed social life for the better. Though these achievements have been partial reforms rather than sweeping revolutions, many of the basic freedoms, rights, and material advantages of modern life were fought for by people called radicals, dangerous revolutionaries, or anti-American:

- restrictions on the exploitation of workers, from the eight-hour day to the right to unionize;
- resistance to cultural imperialism and racial discrimination;
- a host of government programs, from unemployment insurance to social security, from the Environmental Protection Agency to fair housing laws;
- restrictions on opportunistic and destructive American foreign policy in Vietnam, El Salvador, Nicaragua, and other nations.

While radicals have not been alone in seeking these goals, they have often led the fight. Perhaps more important, they have offered a theoretical analysis which shows the *connections* between problems which may appear to be

separate. They have argued that the sexist treatment of women and ecological devastation may have the same root. They have shown the links between the private control of wealth and an expansionist foreign policy. They have analyzed the family, the factory, the army, and the government as parts of the same system of domination.

Along with both the concrete successes and the global vision, radicals have—sadly—too often reproduced the ideas and relationships they sought to destroy. Marxists demanded an end to unjust society—yet formed authoritarian organizations where dissent was repressed. Radical feminists proclaimed "sisterhood is powerful," but often ignored Black women or poor women. At times ecologists, in trying to save nature, have been disrespectful of human beings.

Some of the worst failures came, in short, not from being radical, but from *not being radical enough:* not inclusive enough, not honest enough, not willing to examine how radical political programs and group behavior reproduced an oppressive, unjust society. Awareness of these failures reminds us that revolutionary thought cannot limit itself to critique of the larger society, but also requires self-criticism. While this process can degenerate into petty sectarian hostilities, it also shows that authentic radicalism is not a dead graven image, but a living quest to learn from the past and change the future. In the attempt to create solidarity and community among the oppressed, for instance, radicals have recently spent much effort trying to address and appreciate fundamental differences in social experience—between black and white workers, men and women, temporarily able-bodies and disabled, gay/lesbian and straight. In this effort, radicals have wrestled with the paradox that persons may simultaneously be victims of one system of domination and agents of another one.

The books in this series are part of this radical quest for revolutionary change and continued self-examination. In an era of the sudden fall of totalitarian communism and the frightening rise in the federal deficit, of the possibility of a peace dividend and the specter of the death of nature—these discussions of revolutionary thought and radical movements are needed more than ever before.*

Roger S. Gottlieb

*Thanks for editorial suggestions to Bland Addison, Mario Moussa, Miriam Greenspan, Tom Shannon and John Trimbur.

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C. M.

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INTRODUCTION: WHAT IS RADICAL ECOLOGY?

Radical ecology emerges from a sense of crisis in the industrialized world. It acts on a new perception that the domination of nature entails the domination of human beings along lines of race, class, and gender. Radical ecology confronts the illusion that people are free to exploit nature and to move in society at the expense of others with a new consciousness of our responsibilities to the rest of nature and to other humans. It seeks a new ethic of the nurture of nature and the nurture of people. It empowers people to make changes in the world consistent with a new social vision and a new ethic.

To become clear about our own goals for change, we need to reflect on the ways in which we have absorbed the norms and roles of the larger society in which we live. How can we replace feelings of individual helplessness with feelings of power to make changes consistent with a new social vision and a deeper, more articulate environmental ethic? We can begin by reflecting on our own family history and our own socialization.[1]

SELF IN SOCIETY

Consider your own family's history and place in society going back at least to your grandparents' generation. Were your ancestors native to this country? Are you or your parents first-, second-, or perhaps eighth-generation immigrants? What large events–wars, depressions, revolutions, social movements—shaped

their lives? How did your families use the land and relate to nature? Which of their values have you absorbed? Which have you rejected? Think also about the people you know and their family connections to the land.

As people ponder these questions, they become aware of deep-seated contradictions in the ways different classes of people use the land, the ways in which their own values are shaped by their family's history, and of their own struggles to develop new ways of interacting with nature. One student in an environmental ethics class writes of her emerging consciousness about the land as source of both commodity and beauty, of people as both beneficiaries of and laborers on the land, and the work ethic that has guided individuals in the struggle to overcome hardship.

> I grew up with my father's extended family. His family is mostly made up of farmers. My father grows wine grapes. His uncles are rice farmers; his Aunt Opal is an Oklahoman who came out to California during the Dust Bowl years. My father is "the one who made it" on his side of the family. I grew up pruning grapes alongside my uncle and Mexican migrant workers on weekends and attending good schools with affluent Marin County kids on weekdays. I spent many years working with my brothers and sisters and family friends out in the fields, picking grapes, pruning, installing irrigation systems, suckering, tying vines, or rounding up cattle and sheep. While working in the fields I grew to respect and wonder at nature.…Since my background is ethnically diverse, I was raised without specific religious or ethnic indoctrination. My life experience has created values oriented around family, hard work, interaction with nature, education, and contribution to society.

Another student's family history seems to recapitulate American history in optimizing opportunities presented by the westward movement in a land of abundance. Yet this same expansionist potential apparent to her nineteenth-century ancestors poses a sharp contradiction for her own twentieth-century consciousness shaped by a growing sense of the need for conservation and an alternative land ethic.

> My mother's family descended from French Huguenots who fled to England and then came to the United States around the time of the American Revolution. Their Puritan work ethic and pioneer spirit, searching for abundant land resources and freedom, are the foundation upon which the values of my mother's family developed. Their family settled in the Tennessee hills. Later my great-great-grandfather made the move by train and covered wagon to the

promised land of the Oregon country. My mother's side of the family were farmers and it seems that each successive generation worked its way up the socioeconomic ladder through hard work and thrift and an especially strong emphasis on education. Both my grandmother and grandfather obtained college educations which were made possible by the land grant and agricultural college systems. My grandfather's farming practices were influenced by the new conservation practices emerging in the 1950s in reaction to the devastating effects of the Oklahoma Dust Bowl.

The ethics I struggle with today have evolved within the context of a family history whose relationship has been close to the earth. I believe that today we need a more spiritual way of feeling our relationship with the earth. I also believe an environmental ethic must acknowledge the historical domination of women and the environment by men. Our ethical model needs to come from outside patriarchal social structures.

A recent student immigrant reflects on his family's class status, recognizing the ways in which privilege in both First and Third World countries is linked to exploitation of the earth and of other humans. He intimates that radical transformation is needed to reverse the failures of social justice and the degradation of the planet.

Born in Lima, into the richest ruling class of Peru, my family of eight (six kids; I was the baby) was capable of escaping the political persecution of the incoming military regime in 1969 by moving to an entirely new area in California—the land of suburbia. There our familial Catholic, South American, upper-class morals and behavior would be coupled with the surrounding WASP, upper-middle-class, consumptionist mentality to create my socio-economic environment.…Wastefulness, materialism, and inequality were accepted and ubiquitous, while conservation, non-material wealth and happiness, and social justice were unheard of and unpursued.…The notion that the planet earth had seen better days, which dawned upon me gradually in high school, gained momentum in college. About the time my sister joined Earth First!, I took an environmental studies class and all my worst fears were confirmed.

All three students have become painfully aware that the transformation of nature into commodity, which allowed their parents' and grandparents' generations to rise in status, has had immense linked environmental and human costs. The value placed on the individual's hard work brought family success, but new values that sustain rather than degrade nature and other people are now needed.

SOCIETY IN SELF

How have you yourself been socialized? What effect has the society in which you grew up had on you as a female or male? Have you experienced sexism or racism in your daily life? What historical forces—immigration movements, urbanization, social mobility, educational opportunities—have helped to create your own economic position? Think about the values you have derived from your school, your church, and your workplace. How have the politics and economics of your community affected you? What environmental values have you formed as a result?

One student contrasts his family's economic socialization in rural and urban China with his own socialization in New York City. Immigration, he believes, fostered frugality and conservation of economic resources in the city, a value derived from peasant life in rural China. He ponders whether he can transcend his urban socialization to reclaim the connections his grandmother once felt to nature.

> My grandparents spent most or all of their adult lives as peasant farmers in small villages outside of Canton, China. My parents moved out of rural China during the 1950s and 1960s to come to New York City. My father managed a Cuban-Chinese restaurant while my mother occasionally took in sewing. From my grandparents to my parents to me, my family has moved through dimensions of geography, nationality, culture, industrialization, and financial power—from rice paddies in rural China to the industrialized islands of Hong Kong and Cuba to the richly dense urban construction and development of New York City.
>
> What environmental ethics and philosophy have arisen from such a background? There is an ethic of non-wastefulness; to take only as needed, to conserve as much as possible, to put to use as many aspects of a resource as possible. There is a sense that resources are limited—there is only so much water in the world, only so much money in the family. Perhaps these two ethics come from the habits of subsistence living, the life of a peasant farmer, the life of lower-class immigrants just arrived in a new land. The little resources not required for subsistence are saved up for two future possibilities: the opportunity to rise up from subsistence living, and the possibility of disaster, of a disruption in the flow of resources. In the rice paddies, there were no pesticides, no processed fertilizers, no weather satellites—you used your senses and your body and your memory. I've sometimes envied my maternal grandmother, because it seems as if she is in some special harmony with the world—a harmony which I feel is lost to me, a member of a very industrialized society whose experience of this world is heavily mediated by technology. Yet I do feel that my maternal grand-

mother connects me with that harmony. But how will I, in turn, pass it on to my own children, should I have any?

Another student is deeply aware of how her own place in society has been carved out for her through a long history of male interests and influence in the economy and politics. She reflects on how both men and women are shaped by society's expectations of them, creating roles that incorporate the dominant worldview in which humans are individual atoms in a vast social and cosmic machine. She suggests that only a painful inner transformation to a new ethic will allow people to move beyond historically created roles to realize an ecologically just society.

I am the granddaughter of four European immigrants. My parents' highest value is upward mobility. Their personal history, as the only son of urban Italians and as a girl longing to get off the farm on the edge of the Dust Bowl during the Great Depression, sealed their "ethical fate." In my family, my father's ethnic heritage is dominant. Boys are preferred over girls. Patriarchal values and a pervasive sense of guilt have dribbled down. Individual achievement is paramount. If you are a girl, you must either choose the female traditional role or your achievement must be of an even higher order than boys. In a broader sense, my family's philosophies are mechanistic. We are only cogs in a great machine—the individual soul and personality have no intrinsic worth. Since this implies that we are all interchangeable, we must be competitive in *every* situation, lest another take our place. Self-interest is the highest priority. My familial experience has propelled me to the Left. For me ecojustice seems to be the truth. As Robertson Davies said (in the *Deptford Trilogy*), "If you do not choose a philosophy of life (however painful that choice may be), it will choose you."

Through reflection, another woman becomes aware that her socialization is the outcome of a combination of the economic forces shaping a company town that exploited men as miners and nature as a resource, and an unusual "feminized" Methodist religious heritage. Her environmental ethic is a consequence of the freedom of thought this feminist heritage fostered.

My great-grandparents on my father's side of our family lived in a coal mining town outside of Morgantown, West Virginia. It was a 'company-town,' owned and controlled by one man. Great-grandfather was one of the miners and he and my great-grandmother lived in what my Dad has referred to as a 'shack.' After my great-grandfather died of black lung, my grandfather began working in the mines. But the mining town split up around the 1920s. I guess that

> they had extracted all of the existing coal from that area of the Blue Ridge Mountains.…
>
> My parents had no sons, so their four daughters played the roles of girl and boy, daughter and son. We were all raised in the Methodist Church, attending Sunday School as children and Methodist Youth Fellowship as teenagers. Our church had three women pastors. Lay women would often read scriptures during services, and references to "he" in the Bible were always read "he/she." I was always encouraged to formulate my own religious ideas and eventually rejected Christianity altogether.…My environmental ethic began with a gut level reaction to environmental destruction, supporting its wrongness with facts, and developing a new set of morals and values to live by.

These voices reveal some of the ways in which social patterns are imprinted on us as we grow up amid a variety of economic, political, religious, and genderized social forces. Recognizing that we ourselves are reflections of the values and norms of the larger society allows us to step back and reassess those values. Through this process we can articulate an ethic that either sustains or reforms the institutions around us. In so doing, however, we may find ourselves acting at odds with the dominant values of our society.

SELF VERSUS SOCIETY

Our lives today bear the continuities of the past, but our futures reflect the problems facing the next generations. We go on making and remaking ourselves each day as history unfolds and society changes. What conflicts do you experience between your own values and goals and the institutions and environment you anticipate in the future? What expectations do you have for yourselves and your children? How might your children's values differ from your own? How can you help to bring about a world that will provide them with a high quality of life?

One student professes skepticism that the underlying capitalist system can be transformed, but offers education as a method of revealing its inherent contradictions and a pathway toward reforming its problems.

> Until I went to boarding school my world was very simple. There were the bad people who strip-mined for coal and there were the good people who ran my summer camp. School forced me to question my basic assumptions. Suddenly my black and white world was overwhelmingly grey. It did not occur to me

> that minimum impact camping was possible only if you accepted the fact that a Third World country was being drilled and drained of its precious blood. The contradictions in society are everywhere. It is too easy to reduce the present world situation to good guys and bad guys. I recognize that capitalism has problems, but it does not seem productive to label the system as the scapegoat for all of society's ills. I look to education to remedy the problems facing the world, because I am convinced that if people understand what is happening they will work toward a solution.

Another student places hope in social movements as a transformative method. She sees her own alienation from society as a source of power that enables her to find others willing to work toward meaningful change.

> Once I believed I was beyond the influence of class structure, a hybrid cross with the ability to choose my class identity. But life has a way of obliterating fantasy. Currently, I have no difficulty identifying myself as working class, although the average person might see me a part of the great American middle class. My first awareness of myself as opposed to society was the early knowledge of my bisexuality and I viewed society and its dominant institutions through an outcast's eyes. I now understand myself within the context of alienation, of self versus society. However, I have mitigated this stance by initiating and participating in group actions to change the institutions I find alienating. Through participation in movements, I have been able to experience, even to create, society in self, while acting as self against society.

Is there a way to move forward both in thought and action that diminishes feelings of helplessness as well as tendencies to "blame the system?" Can we find a ground for environmental analysis and a means for putting it into practice? Radical ecology offers one such approach—an approach that helps us to analyze current problems, to construct new theoretical frameworks, and to find people and social movements that support our efforts to improve the quality of life.

RADICAL ECOLOGY

Ecology as a science emerged in the late nineteenth century in Europe and America, although its roots may be found in many other places, times, and cultures. The science of ecology looks at nonhuman nature, studying the numerous, complex interactions among its abiotic components (air, water,

soils, atoms, and molecules) and its biotic components (plants, animals, bacteria, and fungi). Human ecology adds the interactions between people and their environments, enormously increasing the complexities. Human ecology has been most successful when it studies clearly defined places and cultures—the Tsembaga people of Papua New Guinea, the Shoshone Indians of the American West, the Tukano Indians of the Amazonian rainforests. When time is added as an additional dimension, environmental history emerges as a subject. Even here, temporal changes in specific regions have provided the most grist for the mills of environmental historians—the ecological history of New England, the emergence of hydraulic society in California, changing ideas of wilderness and conservation in America, and so on.

Social ecology takes another step. It analyzes the various political and social institutions that people use in relationship to nature and its resources. Technologies—such as axes, guns, and bulldozers—transform trees, animals, and rocks into "natural resources." Systems of economic production, such as hunting, gathering, fishing, subsistence agriculture, and industrial manufacturing turn the resources into goods for home use or market trading. Cultural systems of reproduction provide norms and techniques that guide families in deciding whether and when to bear children. Laws and politics help to maintain and reproduce the social order. Ideas and ideologies, such as myths, cosmologies, religion, art, and science, offer frameworks of consciousness for interpreting life and for making ethical decisions.

Radical ecology is the cutting edge of social ecology. It pushes social and ecological systems toward new patterns of production, reproduction, and consciousness that will improve the quality of human life and the natural environment. It challenges those aspects of the political and economic order that prevent the fulfillment of basic human needs. It offers theories that explain the social causes of environmental problems and alternative ways to resolve them. It supports social movements for removing the causes of environmental deterioration and raising the quality of life for people of every race, class, and sex.

How can radical ecology help to bring about a more livable world? Environmental problems, as I argue in Part I, result from contradictions (tendencies to be contrary to each other's continuance) in today's society. The first contradiction arises from tensions between the economic forces of production and local ecological conditions; the second from tensions between reproduc-

tion and production. The particular form of production in modern society—industrial production, both capitalist and state socialist—creates accumulating ecological stresses on air, water, soil, and biota (including human beings) and on society's ability to maintain and reproduce itself over time.

The first contradiction arises from the assaults of production on ecology. Examples include the destruction of the environment from the uses of military production (such as the oil spills and air pollution during the 2003 Iraq War or the predicted nuclear winter from nuclear war); global warming from industrial emissions of carbon dioxide; acid rain from industrial emissions of sulfur dioxide; ozone depletion from industrial uses of chlorofluorocarbons; the pollution of oceans and soils from the dumping of industrial wastes; and industrial extractions from forests and oceans for commodity production. These assaults of production on global ecology are circulated by means of the biogeochemical cycles and thermodynamic energy exchanges though soils, plants, animals, and bacteria (see Figure I.1, center circle). Their effects are experienced differently in the First, Second, and Third Worlds and by people of different races, classes, and sexes.

The second contradiction arises from the assaults of production on biological and social reproduction. The biological (intergenerational) reproduction of both human and nonhuman species is threatened by radiation from nuclear accidents (such as the 1979 accident at Three Mile Island in the United States and the 1986 accident at Chernobyl in the Soviet Union) and by toxic chemicals from industrial wastes. The reproduction of human life on a daily (intragenerational) basis in Third World countries is endangered as local food, water, and fuel supplies are depleted by the conversion of lands to cash crops and in the First World as harmful chemicals in foods, drinking water, and indoor air invade the home. The reproduction of society as a whole is imperiled by government policies that support continued industrial pollution and depletion and by industry policies that support continued sex and race discrimination (see Figure I.1, middle circle). A country's form of social reproduction and its form of economic production constitute its political economy. Thus the United States, China, Brazil, Kenya, and Malaysia all have particular political economies.

The global ecological crisis of the late twentieth century, I argue, is a result of these deepening contradictions generated by the dynamics between production and ecology and by those between reproduction and production.

But problems of pollution, depletion, and population expansion have specific roots in each country's internal history, its place in the global order, and the current trajectory of its internal development. Each environmental problem therefore needs to be examined in the context of its own specific history as well as its linkages to global political economies (see chapter 1).

As these two contradictions become more visible, they also undermine the efficacy of Western culture's legitimating worldview, pushing philosophers, scientists, and spiritualists to rethink human relationships with the nonhuman world (see Figure I.1, outer circle). The mechanistic worldview created

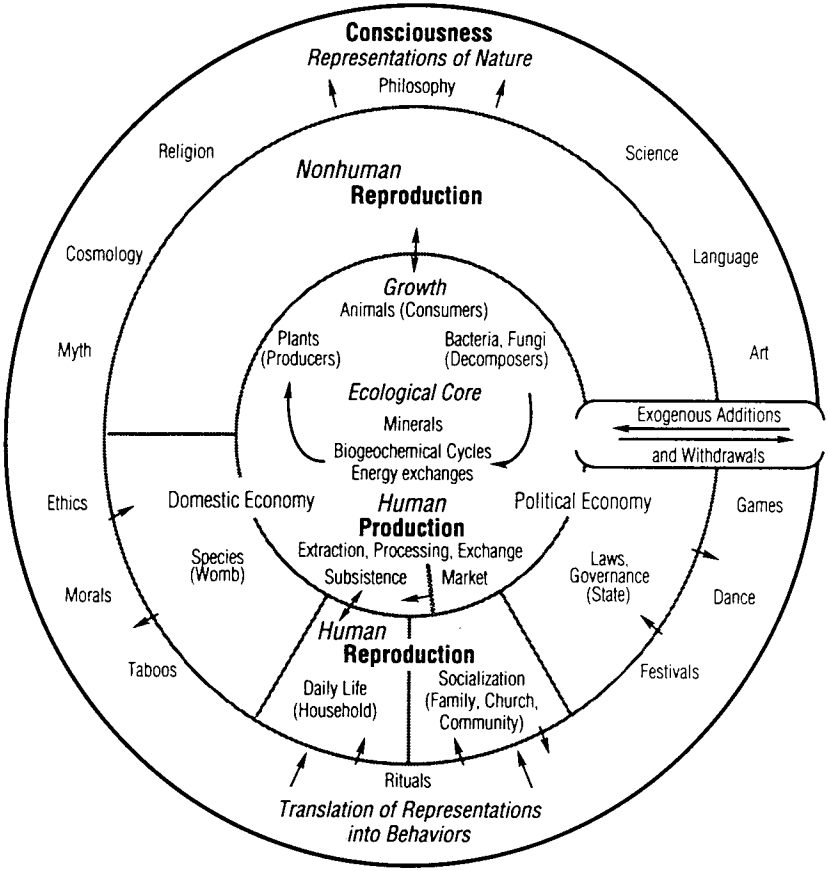

Figure I.1 Conceptual Framework for Interpreting Ecological Revolutions

Source: Carolyn Merchant, *Ecological Revolutions: Nature, Gender, and Science in New England* (The University of North Carolina Press, Chapel Hill and London, 1989), 6–7, reprinted by permission.

during the seventeenth-century scientific revolution constructs the world as a vast machine made up of interchangeable atomic parts manipulable from the outside, just as the parts of industrial machines can be replaced or repaired by human operators. This mechanistic worldview, which arose simultaneously with and in support of early capitalism, replaced the Renaissance worldview of nature as a living organism with a nurturing earth at its center. It entailed an ethic of the control and domination of nature and supplanted the organic world's I–thou ethic of reciprocity between humans and nature. Mechanism and its ethic of domination legitimates the use of nature as commodity, a central tenant of industrial capitalism (see chapters 2 and 3).

Deep ecologists (chapter 4) call for a total transformation in science and worldviews that will replace the mechanistic framework of domination with an ecological framework of interconnectedness and reciprocity. Spiritual ecologists (chapter 5) see the need to infuse religions with new ecological ideas and revive older ways of revering nature. Social ecologists (chapter 6)

Figure I.1 Ecology, production, reproduction, and consciousness interact over time to bring about ecological transformations. The innermost sphere represents the ecological core within the local habitat, the site of interactions between ecology and human production. Plants (producers), animals (consumers), bacteria and fungi (decomposers), and minerals exchange energy among themselves and with human producers in accordance with the laws of thermodynamics and the biogeochemical cycles. Introductions and withdrawals of organisms and resources from outside the local habitat can alter its ecology. Human production (the extraction, processing, and exchange of resources and commodities) is oriented toward immediate use as food, clothing, shelter, and energy for subsistence or toward profit in mercantile trade and industrial capitalism. With increasing industrialization, the subsistence oriented sector declines and the market oriented sector expands.

The middle sphere represents human and nonhuman reproduction. The intergenerational reproduction of species and intragenerational survival rates influence ecological interactions directly in the case of nonhuman individuals or as mediated by production in the case of humans. In subsistence (or use value) societies, production is oriented toward the reproduction of daily life in the household through the production of food, clothing, shelter, and energy. For humans, the reproduction of society also includes socialization (in the family, church, and community) and the establishment of laws and governance that maintain order in the tribe, town, state or nation.

Human consciousness, symbolized by the outermost sphere, includes representations of "nature" reflected in myth, cosmology, religion, philosophy, science, language, and art, helping to maintain a given society over time and to influence change. Through ethics, morals, taboos, rituals, festivals, dance and games, they are translated into actions and behaviors that both affect and are affected by the environment.

The "semi-permeable" membranes between the spheres symbolize possible interactions among them. Ecological revolutions are brought about through interactions between production and ecology and between production and reproduction. These changes in turn stimulate new representations of nature and forms of human consciousness.

see a total transformation of political economy as the best approach. Most of these theories entail an ecocentric ethic in which all parts of the ecosystem, including humans, are of equal value, or an ecologically-modified ethic that values both environmental justice and social ecology.

Radical environmental movements draw on the ideas and ethics of the theorists, but intervene directly to resolve the contradictions between ecology and production and between production and reproduction. Green political activists (chapter 7) advocate the formation of green parties that would recast social and political reproduction and a variety of direct actions that would reverse the assaults of production on reproduction by saving other species, preserving human health, and cleaning up the environment. Ecofeminists (chapter 8) are particularly concerned about issues that affect women's own bodies in biological reproduction (such as toxic substances and nuclear radiation) and women's roles in social reproduction (such as altering workplace/homeplace patterns and norms). The antiglobalization and sustainable development movements (chapter 9) search for new approaches to resource use that would reverse the assaults of production on ecology, thereby renewing and preserving soils, waters, air, and biota.

Although radical ecology pushes for change and social transformation, it is not a monolithic movement. It has many schools of thought and many action groups. Its branches are often at odds in goals and values, as well as techniques and specific actions. These produce conflicts and heated debates within the larger movement resulting in a variety of approaches to resolving environmental problems. My own view is one of guarded optimism, placing hope in social movements that intervene at the points of greatest ecological and social stress to reverse ecological damage and fulfill people's vital needs. The goals of production need to be subordinated to the reproduction of life through the fulfillment of human needs and the preservation of local ecologies and to be informed by an ethic of partnership between humans and nonhuman nature. Although the new worldview advocated by deep and spiritual ecologists may not lead the social transformation, it can nevertheless foster and support the new economic and social directions taken. Perhaps over the next five decades a global ecological revolution will take place so that by the middle of the twenty-first century we will have new forms of production, reproduction, and consciousness that will sustain both people and the natural environment. Such a transformation would fulfill much of the vision and hope of radical ecology.

Many people will disagree with the goals of radical ecology. Perhaps most will decline to participate in its various actions. Yet radical ecology offers a critical standpoint from which to view and analyze mainstream society and mainstream environmentalism. It sharpens our understanding of the assumptions underlying Western civilization and its values. It broadens our perspective on Third World economic and environmental problems. It helps us to formulate answers to the dilemmas of self in society, society in self, and self versus society.

The visibility of radical environmental movements may make mainstream environmental goals more acceptable. Radical actions often raise public consciousness about issues enmeshed in bureaucratic technicalities. Changes triggered by radical actions may then come about through normal political processes. Although it may fail to bring about revolutionary transformation, radicalism can still be effective in changing attitudes, raising consciousness, and promoting social change. The following chapters offer an account of environmental problems, radical ecological theories, and social movements from the perspectives of both proponents and critics in the search for a livable world.

I

PROBLEMS

1

THE GLOBAL ECOLOGICAL CRISIS

The twenty-first century world is experiencing a global ecological crisis, one that is both a product of past ecological and economic patterns and a challenge for the future. From nuclear disasters to Gulf War oil spills; from tropical rainforest destruction to polar ozone holes; from pesticides in food to toxics in water, the earth and all its life are in trouble. Industrial production accentuated by the global reproduction of population has put stress on nature's capacity for the reproduction of life. Pollution, depletion, and poverty are systematically interlinked on a scale not previously experienced on the planet.

The dimensions of a global ecological crisis are painfully visible. The 2002 United Nations' World Summit on Sustainable Development held in Johannesburg, South Africa, focused worldwide attention on the linkages between poverty and the degradation of the world's atmosphere, waters, and forests. Protecting the environment, it concluded, is critical to combating poverty and promoting human dignity, democracy, and peace. The United Nations' Millennium Development Goals commit rich and poor countries alike to a global partnership to improve environmental and human health.[1] A new ethic of sustainable partnership between humans and nonhuman nature is needed.

With increasing public awareness of global problems, public concern has mounted. The first Earth Day held on April 22, 1970 and organized by Wisconsin Senator Gaylord Nelson and environmentalist Dennis Hayes

witnessed a nationwide outpouring of young and old dedicated to the importance of halting environmental degradation and promoting lifestyle changes. Earth Summits held in Stockholm, Sweden, in 1972; Rio de Janeiro, Brazil, in 1992; and Johannesburg, South Africa, in 2002 accentuated the urgency of global action.

In January 1989, *Time* magazine's person of the year award went to "The Endangered Earth," graphically illustrated by sculptor Christo as a suffocating globe wrapped in plastic and bound with twine. In June 1989, a *New York Times*/CBS poll found that an astonishing 80 percent of all Americans questioned overwhelmingly agreed with the statement: "Protecting the environment is so important that requirements and standards cannot be too high, and continuing environmental improvements must be made regardless of cost." Over 70 percent of Americans consider themselves to be environmentalists and advocate stronger environmental protections. Phrased as a two-way choice between environmental protection and economic growth, however, the answers depend on the state of the economy. In 2000, a Gallup poll showed that 67 percent of Americans believed that "protection of the environment should be given priority, even at the risk of curbing economic growth." During the recession of the early 2000s, however, that number began to drop, reaching 49 percent by 2004.[2]

These concerns and public sentiments regarding the environment and the economy pose serious questions. Can planetary life sustain itself in the face of industrial assaults? How is the current environmental crisis in production manifested? How are the planet's airs, waters, soils, and biota interconnected?

AIR

Today the hot air of "greenhouse gases" indicates that the earth's climate is warming dangerously.[3] As the amount of carbon dioxide and other gases in the atmosphere increases from industrial processes and the burning of fossil fuels, global temperatures are predicted to rise from 3 to 10 degrees Fahrenheit during the twenty-first century. A one-degree average warming has already been measured over the past several decades. Although there is much debate over the timing of the effect, the symptoms of global warming are clear and include heat waves, rising sea levels, melting glaciers, polar warming, early springs, more intense storms, spreading diseases, and vanishing biota.

Americans became deeply aware of global warming during the intense hot summer weather of 1988. During Congressional hearings held at that time, scientists and policy analysts warned that the greenhouse effect is already here and that it will worsen. According to then Senator Timothy Wirth, "The greenhouse effect is the most significant economic, political, environmental, and human problem facing the 21st century."[4] Three countries, the United States (43 percent), China (23 percent), and Russia (12 percent) by 2001 produced over 70 percent of all carbon dioxide emissions.[5] The goal of the Kyoto Protocol of 1997 and its revision in Brussels in 2001 was to cut global emissions of 1990 greenhouse gas levels by 5 percent by 2012. With ratification by Russia in November 2004, the protocol entered into force in February 2005, committing 30 industrialized countries to meeting the 2012 targets. The United States and Australia remained major holdouts.[6]

With global warming, winters will become stormier, snowpacks lighter, and summers hotter and drier. Arctic sea ice now covers 15 percent less water than it did twenty years ago and the Alaskan tundra is thawing; in the Antarctic a large ice shelf has detached itself from the continent.[7] Seas are predicted to rise one to three feet during the coming half century and hurricanes will become more powerful as the oceans warm. Waterfront homes will be flooded, midwestern droughts will increase in severity, grain growing regions will move north, trees will move gradually upward on mountain slopes, and wild species will become extinct.[8] Concurrently, animals and plants will migrate northward and reproduce earlier in the year.[9] A series of measures to slow global warming has been recommended, such as stopping global deforestation, planting trees, conserving heating fuel, and shifting to alternative energy sources.[10] Lester Brown of Worldwatch Institute, which issues regular reports on environmental deterioration, sees a ray of hope: "The world does seem to be approaching a kind of paradigm shift in environmental consciousness," he states.[11]

Ozone depletion is another global disruption caused by industrial production. In 1985 scientists reported a hole in the ozone layer over the Antarctic. As a result of worldwide concern, twenty-four countries meeting at Montreal in 1987 agreed to reduce production of the prime culprit, chlorofluorocarbons (CFCs), by 35 percent by 1999. While significant progress in eliminating CFCs in developed nations has occurred (a 70 percent reduction was achieved by 1999), developing nations are still in the early stages of compliance. CFCs

are used as refrigerator and air conditioner coolants, as primary components of Styrofoam™, and as propellant gases in spray cans (banned in the United States in the 1970s, but still used in other countries). Halons (such as hydrofluorocarbons [HFCs]), used as fire retardants, destroy ten times more ozone than CFCs; production has increased in China, Brazil, and Mexico.[12] Alternatives to CFCs and halons are now being sought, but much work needs to be done by scientists, by Congress in regulating CFCs, and by all of us in changing the habits of our everyday lives.[13] These disruptions of the atmospheric balance of gases by industrial production are intimately connected to the disruption of global waters.

WATER

The waters of the world and their life-giving foods and fluids are in jeopardy. Fresh water supplies for drinking and watering crops are dwindling, especially in arid regions. By 2015, 40 percent of the world's population will live in areas without enough water for basic needs.[14] From high mountain lakes to wild rushing rivers, waters in the United States and other industrialized nations are threatened by acid rain (caused by sulfur and nitrogen oxides released in the burning of fossil fuels). In developing countries such as China, India, Thailand, and Korea, levels are already high and on the increase.[15] Beaches are inundated by solid wastes; globules of oil float on the surface of even the remotest oceans. Coral reefs worldwide are losing reef fish and other species as fishing expands.[16]

Ocean fish are declining at an unprecedented rate, the result of more efficient fishing methods. Ninety percent of ocean species, including cod, halibut, tuna, swordfish, and marlin have disappeared from traditional fishing grounds since the 1950s. Today, with improved technologies and vast fishing nets, 80 percent of a target species can be fished out in fifteen years or less.[17] Diving birds and mammals become entrapped in plastic drift nets 6 to 30 miles in length used primarily by Japanese and other East Asian fishers. Seven hundred miles of nets are lost each season in the Pacific Ocean. When the nets escape they go on trapping marine life until they sink under their own weight.[18] Plastic wastes in the oceans bring death to upward of 2 million birds and 100,000 marine mammals a year. Dead and dying birds entangled in nondegradable plastic six-pack rings appear on beaches every day. While some

rings degrade in sunlight, most will go on for another 450 years, outliving the generations they are extinguishing. Seabirds, fish, turtles, and whales lunch on small plastic pellets produced as wastes in the plastics industries. Global water pollution needs to be halted and water quality restored.

SOILS

Soil erosion and pollution from long-lasting insecticides are harming croplands and ground water quality. In the United States, two billion tons of topsoil are being lost annually through wind and water erosion, threatening one-third of our croplands. If allowed to continue over the next fifty years, United States grain production could sink to about half of what it exported in 1980, affecting millions of people around the world.[19] In India, land has been used to feed people for over forty centuries, with only 5 to 10 percent of the surpluses leaving the local villages. According to conservationist Vandana Shiva, Green Revolution farming techniques have now replaced traditional methods, teaching Indian farmers "to forget about the hunger of the soil and the stomach and to go after their own hunger for profits." Soil conservation and sustainable agriculture based on the wisdom of traditional peoples need to be combined with many of the positive advances in twentieth-century agriculture.[20]

BIOTA

Today, the reproduction of life itself is being aborted. In the words of *Time* magazine, "the death of birth" poses another immense global threat to all non-human species. Species are disappearing at 100 to 1000 times the "natural" rate owing to habitat loss, invasive species, and over-hunting. Only 1.4 million of the 5 to 10 million species of life in the world have even been named. Increased efforts must be taken to identify them, understand their ecology, and to educate the public in the need for preservation.[21] International agreements have been reached on halting some of the most visible threats. The United States and Europe have banned imports of ivory from the African elephant although illegal trade continues. Japan has halted imports of some endangered species such as the Hawksbill Turtle used for exotic ornaments and wedding gifts. But changes in policies and practices may not be in time

to preserve the lives of known endangered species, much less those not even identified.[22]

Forests that absorb carbon dioxide and produce oxygen, linking air, water, and biota in a unity, are disappearing at a rapid rate. Tropical forests, which cover 2.3 million square miles of the earth's surface, are disappearing at the rate of 100 acres a minute or more; and the rate of destruction is increasing. If the destruction continues, it is predicted that little will be left by the year 2040. The United States imports enough timber from tropical rainforests each year to cover the state of West Virginia.[23] In Central and Latin America, rainforests are being cut down to pasture cattle for the fast food industry. In Indonesia, 500,000 acres of rainforest have been converted to eucalyptus plantations to produce toilet paper for North America. Much of the rainforest being slashed in Malaysia is used by Japan to construct throwaway construction forms, boxes for shipping, and disposable chopsticks. In inlets along the coasts of Papua New Guinea, Japanese ships anchor to receive timber, leaving behind slash as waste. Quoting Mahatma Gandhi, Martin Khor of the Third World Network admonishes, "There are enough world resources for everyone's need, but not for everyone's greed."[24]

In the United States, Pacific old-growth redwood and Douglas Fir forests are threatened by logging. Through modernization over the past decade, labor-intensive lumber mills are being replaced by automation, reducing by one-third the number of jobs available. In the process, the Spotted Owl is endangered and loggers and millers face job losses.[25] With increasing forest fires from fuel build-up in the Western states, conservative lawmakers are promoting "healthy forest" initiatives that allow logging of old growth and large trees under the guise of thinning forest fuels.[26] Trying to resolve complex problems such as these will require enormous sensitivity, as well as lifestyle changes on the part of Northern Hemisphere citizens.

Threats to the reproduction of nonhuman life are directly linked to human reproduction and human health. "For nearly a quarter century," writes epidemiologist Devra Davis, "it has been clear that air pollution in the United States kills between 60,000 and 120,000 people each year and sickens millions more." Toxic chemicals range from factory emissions, smog, and radon in the air, to pesticides in the soil, to trichloroethylene in drinking water. Banning chemicals may take decades of studies and congressional hearings before action is taken.[27] According to environmentalist Barry Commoner, humans

and other living things are being invaded by an immense number of toxic chemicals unknown to biological evolution. "An organic compound," he argues, "that does not occur in nature [is] one that has been rejected in the course of evolution as incompatible with living systems." Because of their toxicity, "they have a very high probability of interfering with living processes." Over the past thirty years, the production of organic chemicals from petroleum has increased from about 75 billion pounds per year to over 350 billion. In 1986 concerns such as these led California citizens to pass Proposition 65, an anti-toxics initiative with a 63 percent vote.[28] Citizen actions, such as those being undertaken by national toxics organizations, along with scientific research, are a vital part of the current effort to reduce toxics in the environment.

The global ecological crisis involves all levels of society—production, reproduction, and worldviews—and differentially affects First and Third World peoples.[29] The mixing and transferring of our planet's air, waters, soils, and biota that are publicized as global warming and ozone depletion are not solely the results of interacting physical, chemical, and biological systems. Such a scientific systems view ignores the linkages among processes of production, reproduction, consumption, depletion, and pollution that accompany human economies. Through commodity production and exchange, the rich soils, fossil fuels, minerals, and forests of the Third World end up in the First World as wastes in landfills and pollutants in rivers. Outlawed pesticides and toxic wastes from the First World make their way to the Third World for sale and disposal. When the price of oil rises in the Persian Gulf, First World consumers pay more at the pumps, but Third World tractors are idled and women walk an extra mile for cooking fuel. In First World countries, production and consumption lead to overloaded ecological systems, while in Third World countries, resource extraction leads to exhausted and depleted lands. Economic development is uneven—centers of commerce and consumption toward which goods flow become "overdeveloped"; places on the periphery from which goods and resources flow remain "underdeveloped."[30]

The relationships between ecology and production lead to the first contradiction that constitutes the global ecological crisis. Human production systems put increasing stress on nonhuman nature through the biogeochemical cycles and energy exchanges that unify all ecological processes. As depletion and pollution accelerate, they exceed the resilience of nonhuman nature, severely undermining its capacity to recover from human-induced assaults.

POPULATION

While the first contradiction of the global crisis emerges from the impacts of differing human production systems on nonhuman nature, the second contradiction arises from the interaction between production and reproduction. The impact of humans' biological reproduction on the environment is not direct, but mediated through a particular system of production (see Figure I.1). Social norms and ethical systems, as well as government policies concerning abortion, welfare, and employment, help to regulate the numbers of children born into a given society. Moreover, different modes of production support different numbers of people in particular ecological habitats. The second contradiction is thus between reproduction (both biological and social) and production. The ways in which population affects the environment must be considered within the context of biological and social reproduction and their interaction with production.

Two thousand years ago, the earth had a population of one quarter of a billion people, a figure that did not double until 1650. By then the exchange of foods between the continents allowed the population to double in only two centuries, reaching 1 billion by 1830. The next doubling occurred in only one century reaching 2 billion by 1930. The world's population has continued to grow steadily during our own lifetimes (Figure 1.1). In 1975 the world population was 4 billion, and by 1987 it had reached 5 billion. It surpassed 6 billion on October 12, 1999 and climbed to 6.5 billion in 2005. United Nations' population projections for 2050 vary from a high of 11.2 billion to a medium of 9.1 billion, to a low of 7.7 billion.[31]

Yet despite overall increases in total population, the global growth rate is now slowing and the time for the total population to double is increasing. In the early 1960's, the rate of growth was 2.1 percent a year, with a doubling time of 33 years; by 1990 it had slowed to 1.8 percent and the doubling time had risen to 39 years and by 2005 the growth rate had slowed to 1.13 percent with a doubling time of 63 years. The annual growth rate for the period 2001–2015 was projected to be 1.1 percent. Another sign of slowing growth was that the global annual increment of persons added to the planet per year peaked between 1985 and 1990 at 87 million per year. By 2005 that number had declined to 73 million per year. The number of children born to each woman worldwide was also slowing. The fertility rate (average number

of children per woman) in the period 1970–1975 was 4.5, but fertility had dropped to 2.7 for the period 2000–2005.[32]

In his 1798 *Essay on Population*, Thomas Malthus had argued that population tends to increase in a geometric series (2, 4, 8, 16, 64…), whereas the food supply increased according to an arithmetic series (1, 2, 3, 4, 5, 6…). Thus, even if the food supply could be doubled or tripled it could not keep pace with population growth. Environmental checks on population expansion, such as disease, famine, and warfare keep down the rate of increase. Rational checks, such as those provided by education and foresight into the economic consequences of large families, induce birth limitation through abstinence, contraception, late marriage, and so on. Malthus argued that the educated upper classes kept their populations down, whereas the poor reproduced at high rates. Social welfare simply encouraged them to maintain their low standard of living and their high rate of reproduction. Instead, incentives directed at individual self-interest should be provided, such as healthy work opportunities and agricultural improvement techniques.[33]

Inspired by Malthus' approach, biologists Paul and Ann Ehrlich see all environmental problems as stemming from population: "Global warming, acid

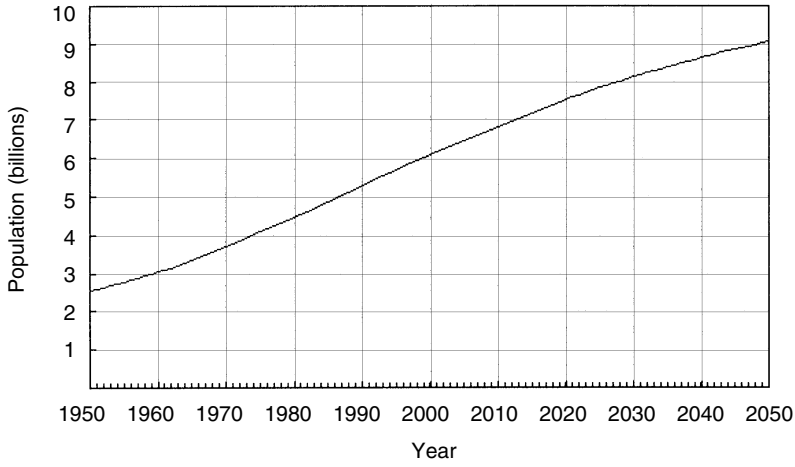

Figure 1.1 World Population: 1950–2050

Source: U.S. Census Bureau, International Data Base, April 2004 version. (Available online: http://www.census.gov/ipc/img/worldpop.gif)

rain, depletion of the ozone layer, vulnerability to epidemics, and exhaustion of soils and groundwater are all…related to population size.…We shouldn't delude ourselves: the population explosion will come to an end before very long. The only remaining question is whether it will be halted through the humane method of birth control, or by nature wiping out the surplus."[34]

According to the Ehrlichs, reduced fertility depends on five factors: adequate nutrition, proper sanitation, basic health care, education of women, and equal rights for women. When women receive education they apply the results to preparing better meals, keeping cleaner, more sanitary homes, and improving the quality of life for their families. Education teaches them about family planning and contraception and affords them access to status other than through bearing and raising children. Men, on the other hand, use their education to obtain higher income producing jobs, raising their status, and decreasing the need for large families. These approaches, say the Ehrlichs, rather than overall development followed by the so-called demographic transition to lower birth rates, are the keys to population control.[35]

Questions of population size and control are extremely sensitive issues. They impinge on the most fundamental questions of human freedom. Freedom of how many children to bear and support, where to live, how goods and services should be distributed, a woman's right to abort a pregnancy, and the right of an unborn fetus to life. In rural China, an attempt to reduce population by a government policy of limiting families to one child resulted in the widespread abortion of female fetuses, brought about by an age-old agrarian preference for male labor. In India, Indira Gandhi's policy of pressuring sterilization of government employees after three offspring produced a backlash against its family planning program. In the United States, a woman's right to choose to abort a fetus versus the right of the fetus to life has become a major political issue in all elections, and in presidential appointments to the Supreme Court.[36] A more complex analysis therefore would include cultural factors.

A second approach is articulated by demographer Joel Cohen in his book, *How Many People Can the Earth Support?* Cohen envisions a pyramid whose corners always include population, economy, environment, and culture, each of which interacts with all three of the others. Thousands of such pyramids are scattered all over the globe: "Many of these local pyramids interact strongly over great distances," he writes, "through worldwide financial

and economic integration, through our shared commons of atmosphere and oceans and living species, and through global exchanges of people, microbes, and cultural symbols." As more people come into contact through migration, cultural values also come into conflict. People who share the same space "vary in culture, language, religion, values, ethnicity, and race.…The resulting frictions are evident in all parts of the world."[37]

A third approach to the population question is rooted more centrally in political economy. Geographer David Harvey argues that population, resources, and ideologies of "population control" must be seen in connection with economic modes of production. The number of people that a given environment can support is related to the technologies and social relations that people use to turn nonhuman nature into resources for human use.

To function at an optimal level, Harvey points out, capitalism (now the dominant economic system worldwide), requires a balance between the supply of labor and the demand for goods. If the labor supply (i.e., population) increases, wages fall. Then the workers do not have enough money to buy subsistence goods. More importantly, they do not have the money to purchase commodities above the subsistence level that the capitalists wish to sell—there is no effective demand for the capitalists' products. Thus for capitalism to expand by selling more goods, wages must be kept above the subsistence level. On the other hand, if there are too few workers (i.e., a shrinking population), then wages will be too high and the capitalists will not reap sufficient profits to reinvest and expand production. For Malthus, the solution was to stimulate wants and tastes in the upper classes (landlords, state bureaucrats, etc.) thus creating fresh motives for industry. For others, such as nineteenth-century economist David Ricardo, the problem could be solved by maintaining an equilibrium between capital and population, i.e., between supply and demand. Ricardo's rational, normative approach held that internal harmony within the system would allow a gradual expansion of capitalism.

Harvey's approach is that of Karl Marx. Marx did not see a Malthusian "population problem," but a poverty and exploitation problem. Marx replaced the inevitability of the Malthusian pressure of population on the land with an analysis of the historically specific relationship between the labor supply and employment within the capitalist mode of production. Instead of the Malthusian emphasis on "overpopulation," he developed the concept of a relative surplus population. For capitalism to function smoothly there must

be a "reserve army of labor." This consists of a small percentage (about 4–5 percent)—of, for example, unemployed males, immigrants, and women—who can be hired when the workforce shrinks and laid off when the workforce expands. In this way the capitalist can regulate both wages and demand.

When capitalists keep wages above the subsistence level, workers can purchase enough goods to maintain a reasonable quality of life. Too many children become an economic liability, rather than an asset for producing agricultural subsistence or support for the parents in old age, keeping population growth low. If the population grows too fast, however, capitalism is threatened by riots, strikes, and revolution. It thus walks a tightrope between capital, effective demand, and population. Inherent in capitalism and *essential* to its existence are abundance and scarcity, growth and natural resource depletion, and an economic division between capital and labor, i.e., between haves and have nots.[38]

Marx envisaged a society in which poverty and misery would be replaced by a system that fulfilled all people's basic needs, not just the greed of the few. Whether one agrees or disagrees with Marxist goals, a Marxist perspective offers a critical stance from which to analyze other approaches. A Marxist approach is dynamic and relational. Neither population nor resources can be understood independently of their economic context. A given part of nature is a resource or not depending on its use in a particular system. Thus gold and oil were not resources to Native Americans, but became so for European immigrants to the Americas.

Expanding on Marx's approach, environmentalist Barry Commoner sees population as a problem related to standards of living. The demographic transition to lower population levels is characteristic of both the industrialized world and the developing countries, but the two processes are different. As industrialization proceeded in Europe and North America, the standard of living rose and death rates declined from an average of 30 per thousand in 1850, to 24 per thousand in 1900, 16 per thousand in 1950, and 9 per thousand in 1985. Subsequently the birth rate also began to decline as fewer infants died, people lived longer, and the perceived need to bear additional children changed. The average birth rate began to decline after 1850 from 40 per thousand in 1850, to 32 per thousand in 1900, to 23 per thousand in 1950, and 14 per thousand in 1985. Overall population sizes grew during the nineteenth century, but the rate of increase slowly declined to the 2005 rate of 0.4 percent.

In the developing countries the rate of decline has been slower. The average death rate was about 38 per thousand in 1850, 33 per thousand in 1900, 23 per thousand in 1950, and 10 per thousand in 1985. But the average birth rate has remained higher and declined much more slowly. It was 43 per thousand in 1925, 37 per thousand in 1950, and 30 per thousand in 1985. The 2005 rate of increase has slowed to about 1.5 percent a year. While death rates are about the same as those in the industrialized countries, birth rates are higher.

As the living standards improve and infant mortality declines, couples no longer need as many children to replace those who die. Instead of an economic asset to help support the parents in old age and to provide labor in agrarian communities, children become an economic liability. Costs of housing, clothing, food, travel, and a college education associated with a higher quality of life increase, providing incentives to keep family sizes smaller. Better health and childcare, better nutrition and education, steady employment, and old age security are the strongest incentives to reduction in family sizes. In addition, family planning education and safe birth control methods (as opposed to coercion and unsafe methods) provide added impetus, leading to declining population growth rates (Figure 1.2).

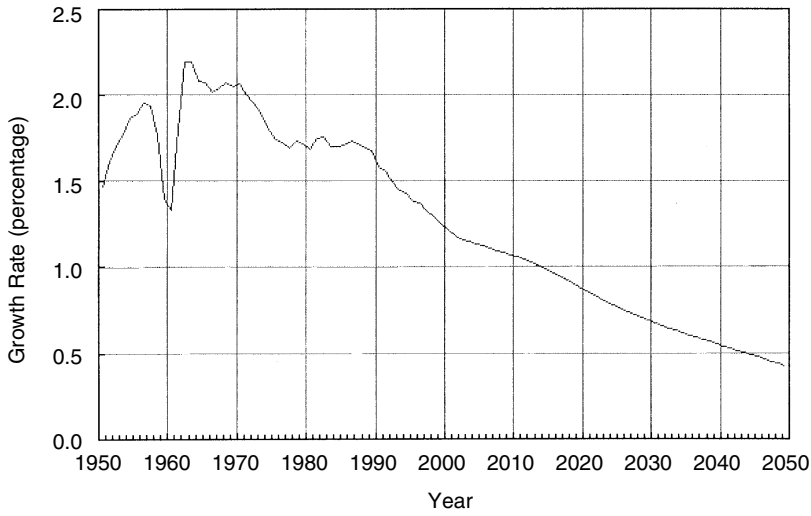

Figure 1.2 World Population Growth Rate: 1950–2050

Source: U.S. Census Bureau, International Data Base, April 2004 version. (Available online: http://www.census.gov/ipc/img/worldgr.gif)

In the developing countries, the demographic transition has lagged because of the political and economic relationships between the center economies of the North and the peripheral economies of the South. Much of the wealth in Third World natural resources, which has been developed with northern capital and southern labor, has been removed from the southern countries. This wealth helps to fuel population decreases in the North while preventing the rise in living standards in the South that would tend to lower birth rates. The developing countries are also thwarted by enormous debts that further stall the demographic transition.

World food production, according to the FAO, is sufficient to support its population and the food supply is growing faster than the population. Nevertheless, that food is not evenly distributed. Some nations, such as those in Africa, have large numbers of starving people while others, such as the United States, have large amounts of food surpluses. Not only improvements in sustainable agriculture, but a redistribution of food and resources is necessary to accelerate the demographic transition. Commoner concludes his analysis with a recommendation:[39]

> The world population crisis, which is the ultimate outcome of the exploitation of poor nations by rich ones, ought to be remedied by returning to the poor countries enough of the wealth taken from them to give their peoples both the reason and the resources voluntarily to limit their own fertility. In sum, I believe that if the root cause of the world population crisis is poverty, then to end it we must abolish poverty. And if the cause of poverty is the grossly unequal distribution of the world's wealth, then to end poverty, and with it the population crisis, we must redistribute that wealth, among nations and within them.

Systems of production, however, can be oriented toward basic subsistence, as they are in much of the Third World and indigenous cultures, or toward market exchange, as they are in First World capitalist economies and dependent Third World colonial economies. Different systems of production have different ecological impacts that result from historically different patterns of economic development.

GLOBALIZATION

The global ecological crisis is exacerbated by the globalization of capitalism. The term globalization has been in currency since the 1980s to characterize

the expansion of corporate capitalism across national boundaries. In a narrow sense, globalization refers to the breakdown of trade barriers and the abolition of tariffs in order to promote free trade among nations. In a larger sense, it depicts the expansion of multinational capitalism to provide corporations with greater power and profits than ever before. Corporations based in the North use resources and labor based in the South where environmental and labor regulations are weak or nonexistent and where accountability is soft. While democratically created legislation resulting from labor, environmental, and consumer movements cuts into profits in the United States, the European Union, and Japan, the relative lack of regulation in Third World countries affords higher profits for corporations doing business overseas. The values of the market thus supercede those of democracy.[40]

The 1990s marked the onset of a new set of alignments on the global political stage. With the breakup of the Soviet Union in 1989, the reunification of Germany, and the decline of communism, cold war politics that had reigned since the end of World War II gave way to the economics of corporate globalization. Multinational corporations increasingly moved jobs overseas, hired cheap labor, and promoted free trade across national boundaries. A higher proportion of economic activity began to take place among people in different countries than among those in the same country. Some transnational corporations have even become richer and more influential than democratically elected governments. This power increases their capacity to avoid democratically established environmental regulations and labor laws.[41]

During the 1990s and early 2000s, corporate globalization was promoted through free trade agreements. The General Agreement on Tariffs and Trade (GATT), designed to promote world trade by reducing tariffs, went through several rounds, the last being the passage of the Uruguay Round in 1995. This agreement created the World Trade Organization (WTO), an international organization that sought to further liberalize trade by freeing corporations from national government regulations and to create a dispute resolution mechanism. The WTO seeks to protect corporate property rights, such as patents on GMOs (genetically modified organisms), software, and commodities. Related mechanisms were the North American Free Trade Agreement (NAFTA) that promoted free trade between the United States, Canada, and Mexico, and the proposal for a Free Trade Agreement of the Americas (FTAA). But free trade is not free. Its labor and environmental costs are

incalculable. Such multilateral agreements undermine an individual nation's regulatory autonomy and environmental accountability because trade disputes are resolved outside of national legislation. These concerns have led to a grassroots anti-globalization movement that has aroused and unified activists around the world in a series of protests held at meetings of the WTO, World Bank, and the International Monetary Fund (IMF) (see Chapter 9).[42]

ROOTS OF GLOBALIZATION

The phenomenon of globalization arose out of the historical expansion of capitalism and colonialism going back to sixteenth-century Europe. The growth of a capitalist system in the European world (and later in North America) was intimately connected to and dependent on a colonial system in the New World. As feudalism (based on the payment of goods and services to a lord by serfs bound to the land) broke down, a dynamic market system began to exploit both land and labor in more efficient ways. Mining and textile production were the first industries to be capitalized. Each expanded through the establishment of a company whose entrepreneurs pooled their wealth to take the risk of developing a mine, establishing a colony, or combining the operations of textile production under a single roof. The capitalists employed laborers who were paid in set wages from which they purchased their own food and clothing, rather than producing it from the land.

European capitalism expanded through the establishment of colonies in the Western and Southern Hemispheres that supplied both the natural resources and cheap labor that extracted them from the earth. The former hegemony of the Mediterranean world gave way to the new hegemony of the Atlantic. Triangular trading patterns established Europe as the center of manufactured goods, Africa as the source of slave labor, and the American colonies as the "inexhaustible" supply of natural resources. The oceans were charted, the new lands mapped, and the natural histories of the peoples, animals, plants, and minerals found there catalogued. European explorers and colonizers brought with them an ecological complex of diseases that devastated native peoples along with livestock, crops, weeds, and varmints that invaded native lands. The colonies were maintained by force of arms, by economic dependency on trade items, by enslavement, and by religious

ideologies as missionaries worked to supplant animistic religions with Judeo-Christian theologies.[43]

Accumulation of economic surplus occurred as natural resources (or free raw materials) were extracted at minimum costs (minimum wages) and manufactured goods were sold at market value. This accumulation of economic surplus through mercantile expansion helped to fuel eighteenth- and nineteenth-century industrialization. Textiles and shoes, guns and ammunition, mechanized farming equipment, and standardized consumer products all depended on atomized replaceable parts and atomized replaceable laborers. Fewer people lived off the land by subsistence and more worked in cities fed by specialized market farmers. Since the period of Europe's industrial revolution (1750–1850) and that of North America (1800–1900), no countries outside of those in the former Soviet bloc industrialized without economic assistance. But China's industrialization now mounts a formidible challenge.

Today's global capitalist system is based on this same fundamental division between the industrialized or center economies of the First World (located primarily in the North) and the underdeveloped or peripheral economies of the Third World (located primarily in the South). Unlike the industrialized nations, the peripheral economies export low cost primary goods such as coffee, tobacco, sugar, jute, rubber, and minerals, and import luxury goods and military equipment for élite consumption. Mass consumer goods are produced through Northern Hemisphere capital (Western Europe, North America, and Japan) and Southern Hemisphere labor (Asia, Latin America, and Africa) for purchase by northern consumers and Third World élites. Instead of enslavement by force or theft of resources, neocolonialism uses economic investments and foreign aid programs to maintain economic hegemony. Today the cost of interest on debt equals or exceeds total export earnings. The poorer countries have become increasingly dependent on the industrialized countries.

While much of the development aid to the Third World is based on First World development patterns, this undifferentiated growth model is inadequate for breaking the Third World dependency cycle. Environmental problems in the Third World are rooted in poverty and hunger, population pressure on marginal lands, and unbalanced land distribution, while those in the First World stem from industrial pollution, waste, conspicuous consumption, and planned obsolescence.[44]

A major problem confronting the capitalist system is the inherent necessity for economic growth. Capitalists make money for further expansion by creating products that consumers will purchase. They do so by fabricating needs for more and fancier food, clothing, and homes, as well as producing luxury items such as better cars, television sets, video recorders, electric shavers, blenders, and microwave ovens. Why not stop the growth mania and focus on quality of life items that fulfill basic needs? If any given producer curtails growth, she or he will be bought out or forced out of business by a competitor. If all capitalists agree together to curtail growth, massive unemployment will occur in a system in which population continues to grow.

Capitalism, however, is not isolated from government. Legislation, regulation, and citizen activism are powerful forces (especially in the United States and Europe) that can mitigate the effects of environmental pollution and improve environmental quality. Yet capitalism is historically subject to fluctuating cycles of inflation and recession and of output and unemployment. In periods of recession, concerns for environmental quality are overridden by attempts to increase productivity and employment. Governmental regulation may decline in the attempt to shore up the economic recovery. In relatively affluent periods, citizen demands for environmental quality tend to increase, as reflected in environmental movements and legal actions. Yet over time environmental quality may tend to lose ground, not returning to former levels during the peaks of relative affluence. Additionally, the environmental preferences and commitments of the political party in control of government agencies and legislatures during any given period may have positive or negative effects on the level of government regulation. All these factors are part of the structure of the social relations of the economic system of a given country and must be seen as interacting with the economy and adding to the complexity of environmental problems and their resolution.

Ultimately, argue socialist ecologists, the impacts of capitalism on the environment, exacerbated by North–South inequalities, will lead to a breakdown of capitalist economies and will open the way for new economic forms (see chapter 6). As an economic system, capitalism is digging its own grave. Other eco-economists, however, see ways to work within the capitalist system to make it ecologically and socially responsible. Among the proposals for green capitalism are natural capitalism and steady-state economics.

NATURAL CAPITALISM

> Imagine for a moment a world where cities have become peaceful and serene because cars and buses are whisper quiet, vehicles exhaust only water vapor, and parks and greenways have replaced unneeded urban freeways. OPEC has ceased to function because the price of oil has fallen to five dollars a barrel, but there are fewer buyers for it because cheaper and better ways now exist to get the services people once turned to oil to provide. Living standards for all people have dramatically improved, particularly for the poor and those in developing countries.…[T]here are few if any active landfills, worldwide forest cover is increasing, dams are being dismantled, atmospheric CO_2 levels are decreasing for the first time in two hundred years, and effluent water leaving factories is cleaner than the water coming into them.…A progressive and active union movement has taken the lead to work with business, environmentalists, and governments to create "just transitions" for workers as society phases out coal, nuclear energy, and oil.[45]

This vision of a new industrial revolution is offered by Paul Hawken, Amory Lovins, and L. Hunter Lovins in their 1999 book, *Natural Capitalism*. While these authors do not challenge capitalism *per se*, they show how the very concept of capital must include environmental services. Rather than merely accumulated profit, an ecologically viable economy must comprise four forms of capital: human capital (physical and intellectual), financial capital (cash and investments), manufactured capital (factories, machines, and infrastructure), and natural capital (natural resources, living systems, and ecosystem services). Natural capital consists not only of natural resources such as trees, grass, oil, and copper, but functioning ecosystems that provide services: forests store water and control floods; the atmosphere supplies clean air, rainfall, and terrestrial and aquatic productivity; wetlands process wastes and regenerate waters; soils store water, decompose wastes, and filter toxins.[46]

The contribution of ecosystem services to the world economy, argue ecological economists, can be valued at around $36 trillion dollars a year. Seventeen such services calculated by a group of scholars included $1.3 trillion dollars a year for atmospheric regulation of gases, $2.3 trillion for waste assimilation and processing, $17 trillion for nutrient flows, and $2.8 trillion for water purification and storage. The source of these services came from both terrestrial and marine ecosystems (around $12.3 trillion for terrestrial systems and $20.9 trillion for marine systems).[47]

Hawken and the Lovins propose a new taxation system based on natural capital. Individuals would retain their entire paychecks, while polluters would pay heavy taxes. Corporations which put gases into the atmosphere would pay, producers of nuclear and non-renewable forms of energy would pay, and air traffic and motor vehicles would pay at the pump including insurance costs. Foods produced with pesticides, synthetic fertilizers, and piped-in water would cost more, while grazing rights, mining rights, and water that deplete aquifers would all be taxed. Individuals and businesses could avoid these taxes by changing their behavior, purchasing patterns, and production methods. Such proposals, they argue, are already in effect in various ways throughout the world and in fact are inevitable. By valuing all forms of capital, the burden on natural capital is decreased and society can move toward sustainability without social upheaval.[48]

STEADY-STATE ECONOMICS

Ultimately, however, growth-oriented economies need to move toward a steady-state world economy, argues economist Herman Daly, a former advisor to the World Bank. While a rapid slowdown would disproportionately affect poor countries and peoples, a gradual transition to a no- or low-growth economy could help to bring about a sustainable and socially just world. A steady state economy, Daly says, is "an economy with constant stocks of people and artifacts, maintained at some desired, sufficient levels by low rates of maintenance 'throughput.'" The throughput is the flow of matter and energy from non-human nature, through the human economy, and back to nature as pollution. A steady-state economy would use the lowest possible levels of materials and energy in the production phase and emit the least possible amount of pollution in the consumption phase. The total population and the total amount of capital and consumer goods would be constant. The economy could continue to develop, but need not grow. Culture, knowledge, ethics, and quality of life, however, would continue to grow. Only physical materials would be constant.

While the rest of the biosphere lives off solar income, human beings, since the transition to an inorganic economy, have been living off non-renewable geological capital. This means that humans are no longer in equilibrium with the rest of nature, but are depleting and polluting it, overloading the

natural cycles. All capital, according to twentieth-century mathematician A. J. Lotka, is a material extension of the human body. Clothing, houses, and bathtubs are extensions of the skin; food, drink, and cooking stoves of the digestive system; toilets and sewers of the elimination system; television and radio of the sensory organs; computers and books of the brain.

Services in the form of psychic satisfaction for humans come from increasing the numbers of artifacts and from the natural resources of the ecosystem. Creating and maintaining the artifacts requires energy throughput which in turn depletes and pollutes the ecosystem. In terms of the laws of thermodynamics, the total amount of energy in the universe is constant (the first law), but the energy available for useful work is decreasing (the second law). The total entropy (the energy unavailable for work) tends toward a maximum and the universe as a whole moves from order to disorder. As the economy uses low-entropy raw materials, it transforms them into higher-entropy artifacts, and emits high-entropy waste. "The laws of thermodynamics," states Daly, "restrict all technologies, man's as well as nature's and apply to all economic systems whether capitalist, communist, socialist, or fascist." While the economy and its artifacts achieve greater order, the ecosystem tends to greater disorder. At some point the ecosystem will be no longer able to provide the services required by the economy. These costs to nature, however, cannot be planned in ordered sequences as can economic costs.[49]

Is a steady-state economy possible, and if so how? Can the world of the twenty-first century move toward a stable no- or low-growth economy as population growth slows and standards of living rise? To move toward a steady-state economy, depreciation of artifacts must be reduced. Planned obsolescence gives way to planned longevity. Cars, refrigerators, and television sets are engineered to last. Obsession with growth is replaced by obsession with conservation. The goal of higher gross national product gives way to the repair of gross national pollution.

CONCLUSION

Ecology, economic production, and reproduction all interact in any given society. The global ecological crisis is a result of contradictions between systems of economic production and ecology and between reproduction and production. First and Third World political economies interact in ways that exacerbate

many of the problems inherent in individual countries. The political economy of the First World is legitimated by a mechanistic worldview that has been dominant since the seventeenth century and an egocentric ethic that assumes that what is best for the individual is best for society as a whole. These issues are discussed in chapters 2 and 3. Many observers believe that the world is moving toward some new state of affairs that will radically change current patterns at all social levels. Part II on radical ecological thought and Part III on radical environmental movements put forward some ideas for transfrmation that may help to resolve the global crisis by attacking the contradictions that lead to it. Such changes would alter current ecolgical, economic, and social relations with nonhuman nature, as well as the mechanistic worldview, helping to create a sutainable world

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2

SCIENCE AND WORLDVIEWS

Is the earth dead or alive? The ancient cultures of the East and West and the native peoples of America saw the earth as a mother, alive, active, and responsive to human action. Greeks and Renaissance Europeans conceptualized the cosmos as a living organism, with a body, soul, and spirit, and the earth as a nurturing mother with respiratory, circulatory, reproductive, and elimination systems. The relationship between most peoples and the earth was an I–thou ethic of propitiation to be made before damming a brook, cutting a tree, or sinking a mine shaft. Yet for the past three hundred years, Western mechanistic science and capitalism have viewed the earth as dead and inert, manipulable from outside, and exploitable for profits. The death of nature legitimated its domination. Colonial extractions of resources combined with industrial pollution and depletion have today pushed the whole earth to the brink of ecological destruction.

THE ORGANIC WORLDVIEW

The cosmos of the Renaissance world was a living organism. The four elements (earth, air, fire, and water) that made up the material world below the moon, and the fifth element (ether) that made the stars and planets were its material body. The soul was the source of its animate daily motion as the sun, stars, and planets encircled the geocentric earth every twenty-four hours. The

spirit, descending from God in the heavens beyond, mingled with the ether and the ambient air, to be imbibed by plants, animals, and humans on the earth's surface.

The living character of the world organism meant not only that the stars and planets were alive, but that the earth too was pervaded by a force giving life and motion to the living beings on it. The earth was considered to be a beneficent, receptive, nurturing female. In the ancient lore, the earth mother respired daily, inhaling the pneuma, or spirit from the atmosphere. Her "copious breathing" renewed the life on its surface. The earth's springs were akin to the human blood system; its other various fluids were likened to the mucus, saliva, sweat, and other forms of lubrication in the human body. As the waters on its surface ebbed and flowed, evaporated into clouds, and descended as dews, rains, and snows, the earth's blood was cleansed and renewed. Veins, veinlets, seams, and canals coursed through the entire earth, particularly in the mountains. Its humors flowed from the veinlets into larger veins. In many places the veins became filled with metals and minerals.

The earth, like the human, even had its own elimination system. The tendency for the earth to break wind was the cause of earthquakes and a manifestation of the earth mother's indignation at humans who mined her entrails. The earth's bowels were full of channels, fire chambers, glory holes, and fissures through which fire and heat were emitted, some in the form of fiery volcanic exhalations, other as hot water springs. The thin layer of soil on the earth's surface was its skin. European peasants nurtured the land, performed ritual dances, and returned its gifts to assure continued fertility. Trees were the earth mother's tresses. Her head was adorned with fringes and curls which the lumber industry sheared off.

A commonly used analogy was that of the female's reproductive and nurturing capacity and of mother earth's ability to give birth to stones and metals within "her" womb through marriage with the sun. For most traditional cultures, minerals and metals ripened in the uterus of the earth mother, mines were compared to her vagina, and metallurgy was the human hastening of the birth of the living metal in the artificial womb of the furnace—an abortion of the metal's natural growth cycle before its time. Miners offered propitiation to the deities of the soil and subterranean world, performed ceremonial sacrifices, and observed strict cleanliness, sexual abstinence, and fasting before violating the sacredness of the living earth by sinking a mine. Smiths assumed

an awesome responsibility in precipitating the metal's birth through smelting, fusing, and beating it with hammer and anvil; they were often accorded the status of shaman in tribal rituals, and their tools were thought to hold special powers.

The image of the earth as a living organism and nurturing mother served as a cultural constraint restricting the actions of human beings. One does not readily slay a mother, dig into her entrails for gold, or mutilate her body. As long as the earth was conceptualized as alive and sensitive, it could be considered a breach of human ethical behavior to carry out destructive acts against it. In much the same way, the cultural belief-systems of many American Indian tribes had for centuries subtly guided group behavior toward nature. Smohalla of the Columbian Basin Tribes voiced the Indian objections to European attitudes in the mid-1800s.

> You ask me to plow the ground! Shall I take a knife and tear my mother's breast? Then when I die she will not take me to her bosom to rest.
>
> You ask me to dig for stone! Shall I dig under her skin for her bones? Then when I die I cannot enter her body to be born again.
>
> You ask me to cut grass and make hay and sell it, and be right like white men! But how dare I cut off my mother's hair?

Such imagery found in a culture's literature can play a normative role within the culture. Controlling images operate as ethical restraints or as ethical sanctions—as subtle "oughts" or "ought-nots." Thus, as the descriptive metaphors and images of nature change, a behavioral restraint can be changed into a sanction. Such a change in the image and description of nature was occurring during the course of the scientific revolution. Today, the organic cosmology, experienced in some form by almost all of the world's peoples for all times, has been superseded.[1]

THE RISE OF CAPITALISM

In the sixteenth century, as the feudal states of medieval Europe were breaking up, a new dynamic force emerged that shattered premodern ways of life and the organic restraints against the exploitation of the earth. Arising in the city-states of Renaissance Italy and spreading to northern Europe was an inexorable expanding market economy, intensifying medieval tendencies

toward capitalist relations of production and capitalist modes of economic behavior. As trade quickened throughout Western Europe, stimulated by the European discovery and exploitation of the Americas, production for subsistence began to be replaced by more specialized production for the market. The spreading use of money provided not only a uniform medium of exchange but also a reliable store of value, facilitating open-ended accumulation. Inflation, generated by the growth of population and the flood of American gold, accelerated the transition from traditional economic modes to rationally maximizing modes of economic organization. The growth of cities as centers of trade and handicraft production created a new class of bourgeois entrepreneurs who supplied ambitious monarchs with the funds and expertise to build strong nation states, undercutting the power of the regionally based landowning nobility.

Whereas the medieval economy had been based on organic and renewable energy sources—wood, water, wind, and animal muscle—the emerging capitalist economy was based on non-renewable energy, i.e., coal, and the inorganic metals—iron, copper, silver, gold, tin, and mercury—the refining and processing of which ultimately depended on and further depleted the forests. Over the course of the sixteenth century, mining operations quadrupled as the trading of metals expanded. Forests were cut for charcoal and the cleared lands turned into sheep pastures for the textile industry. Shipbuilding, essential to capitalist trade and national supremacy, along with glass and soapmaking, also contributed to the denudation of the ancient forest cover. The new activities directly altered the earth. Not only were its forests cut down, but swamps were drained, and mine shafts were sunk.

The new commercial and industrial enterprises meant that the older cultural constraints against the exploitation of the earth no longer held sway. While the organic framework was for many centuries sufficiently integrative to override commercial development and technological innovation, the acceleration of economic change throughout Western Europe began to undermine the organic unity of the cosmos and society. Because the needs and purposes of society as a whole were changing with the commercial revolution, the values associated with the organic view of nature were no longer applicable; hence the plausibility of the conceptual framework itself was slowly, but continuously, being threatened. By the sixteenth and seventeenth centuries, the tension between the technological development in the world of action and the

controlling organic images in the world of the mind had become too great. The old worldview was incompatible with the new activities.[2]

EXPERIMENTAL SCIENCE

During the seventeenth century, the organic framework, in which the mother-earth image was a moral restraint against the exploitation of nature, was replaced by a new experimental science and a worldview that saw nature not as an organism but as a machine—dead, inert, and insensitive to human action. Francis Bacon (1571–1626), following tendencies that had been evolving throughout the previous century, advocated the domination of nature for human benefit. He compared miners and smiths whose technologies extracted ores for the new commercial activities to scientists and technologists penetrating the earth and shaping "her" on the anvil. The new man of science, he wrote, must not think that the "inquisition of nature is in any part interdicted or forbidden." Nature must be "bound into service" and made a "slave," put "in constraint," and "molded" by the mechanical arts. The "searchers and spies of nature" were to discover her plots and secrets.[3]

Nature's womb, Bacon argued, harbored secrets that through technology could be wrested from her grasp for use in the improvement of the human condition. Before the fall of Adam and Eve there had been no need for power or dominion, because they had been made sovereign over all other creatures. Only by "digging further and further into the mine of natural knowledge," Bacon believed, could mankind recover that lost dominion. Nature placed in bondage through technology would serve human beings. Here "nature takes orders from man and works under his authority." The method of science was not to be achieved by developing abstract notions such as those of the medieval scholastics, but rather through the instruction of the understanding "that it may in very truth dissect nature." "By art and the hand of man," nature should be "forced out of her natural state and squeezed and molded." In this way "human knowledge and human power meet in one."[4]

Thus Bacon, in bold sexual imagery, outlined the key features of the modern experimental method—constraint of nature in the laboratory, dissection by hand and mind, and the penetration of nature's hidden secrets—language still used today in praising a scientist's "hard facts," "penetrating mind," or

"seminal" arguments. The constraints against mining the earth were subtly turned into sanctions for exploiting and "raping" nature for human good.[5]

The development of science as a methodology for manipulating nature, and the interest of scientists in the mechanical arts, became a significant program during the latter half of the seventeenth century. Other philosophers realized even more clearly than had Bacon the connections between mechanics, the trades, middle-class commercial interests, and the domination of nature. Scientists spoke out in favor of "mastering" and "managing" the earth. French Philosopher René Descartes wrote in his *Discourse on Method* (1637) that through knowing the crafts of the artisans and the forces of bodies we could "render ourselves the masters and possessors of nature."[6]

John Dury and Samuel Hartlib, followers of Bacon and organizers of the Invisible College (ca. 1645), connected the study of the crafts and trades to increasing wealth. The virtuosi of England's first scientific society, the Royal Society (founded in 1660), were interested in carrying out Bacon's proposals to dominate nature through experimentation. Joseph Glanvill, the English philosopher who defended the Baconian program in his *Plus Ultra* (1668), asserted that the objective of natural philosophy was to "enlarge knowledge by observation and experiment…so that nature being known, it may be mastered, managed, and used in the services of humane life." For Glanvill, anatomy, was "most useful in human life" because it "tend[ed] mightily to the eviscerating of nature, and disclosure of the springs of its motion." In searching out the secrets of nature, nothing was more helpful than the microscope for "the secrets of nature are not in the greater masses, but in those little threads and springs which are too subtle for the grossness of our unhelped senses."[7]

In his *Experimental Essays* (1661), English scientist Robert Boyle distinguished between merely knowing as opposed to dominating nature in thinly veiled sexual metaphor: "For some men care only to know nature, others desire to command her" and "to bring nature to be serviceable to their particular ends, whether of health, or riches, or sensual delight."[8]

The experimental method developed by the seventeenth-century scientists was strengthened by the rise of the mechanical philosophy. Together they replaced the older, "natural" ways of thinking with a new and "unnatural" way of seeing, thinking, and behaving. The submergence of the organism by the machine engaged the best minds of the times during a period fraught with anxiety, confusion, and instability in both the intellectual and social spheres.

THE MECHANISTIC WORLDVIEW

The mechanical view of nature now taught in most Western schools is accepted without question as our everyday, common sense reality—a reality in which matter is made up of atoms, colors occur by the reflection of light waves of differing lengths, bodies obey the law of inertia, and the sun is in the center of our solar system. This worldview is a product of the scientific revolution of the seventeenth century. None of its assumptions were the common sense view of our sixteenth-century counterparts. Before the scientific revolution, most ordinary people assumed that the earth was in the center of the cosmos, that the earth was a nurturing mother, and that the cosmos was alive, not dead.

As the unifying model for science and society, the machine has permeated and reconstructed human consciousness so totally that today we scarcely question its validity. Nature, society, and the human body are composed of interchangeable atomized parts that can be repaired or replaced from outside. The "technological fix" mends an ecological malfunction, new human beings replace the old to maintain the smooth functioning of industry and bureaucracy, and interventionist medicine exchanges a fresh heart for a worn-out, diseased one.

The removal of animistic, organic assumptions about the cosmos constituted the death of nature—the most far-reaching effect of the scientific revolution. Because nature was now viewed as a system of dead, inert particles moved by external rather than inherent forces, the mechanical framework itself could legitimate the manipulation of nature. Moreover, as a conceptual framework, the mechanical order had associated with it a framework of values based on power, fully compatible with the directions taken by commercial capitalism.[9]

The emerging mechanical worldview was based on assumptions about nature consistent with the certainty of physical laws and the symbolic power of machines. Although many alternative philosophies were available (Aristotelian, Stoic, gnostic, Hermetic, magic, naturalist, and animist), the dominant European ideology came to be governed by the characteristics and experiential power of the machine. Social values and realities subtly guided the choices and paths to truth and certainty taken by European philosophers. Clocks and other early modern machines in the seventeenth century became underlying models for Western philosophy and science.

Not only were seventeenth-century philosophical assumptions about being and knowledge infused by the fundamental physical structures of machines found in the daily experience of Western Europeans, but these presuppositions were completely consistent with another feature of the machine—the possibility of controlling and dominating nature. These underlying assumptions about the nature of reality have today become guidelines for decision-making in technology, industry, and government.

The following assumptions about the structure of being, knowledge, and method make possible the human manipulation and control of nature.

1. Matter is composed of particles (the ontological assumption).
2. The universe is a natural order (the principle of identity).
3. Knowledge and information can be abstracted from the natural world (the assumption of context independence).
4. Problems can be analyzed into parts that can be manipulated by mathematics (the methodological assumption).
5. Sense data are discrete (the epistemological assumption).[10]

The new conception of reality developed in the mid-seventeenth century shared a number of assumptions with the clocks, geared mills, and force-multiplying machines that had become an important part of daily European economic life. First of all, they shared the ontological assumption that nature is made up of modular components or discrete parts connected in a causal nexus that transmitted motion in a temporal sequence from part to part. Corpuscular and atomic theories revived in the seventeenth century hypothesized a particulate structure to reality. The parts of matter, like the parts of machines, were dead, passive, and inert. The random motions of atoms were rearranged to form new objects and forms of being by the action of external forces. Motion was not inherent in the corpuscles, but a primary quality of matter, put into the mundane machine by God. In Descartes' philosophy, motion was initiated at the world's creation and sustained from instant to instant throughout created time; for English physicist Isaac Newton (1642–1727), new motion in the form of "active principles" (the cause of gravity, fermentation, and electricity) was added periodically to prevent the non-autonomous world-machine from running down. For German philosopher Gottfried Wilhelm Leibniz (1646–1716), the universal clock was autonomous—it needed no external inputs once created and set into motion. The

ontology of this classical seventeenth-century science, modified by energy concepts, has become the framework of the Western common sense view of reality.

The second shared assumption between machines and seventeenth-century science was the law of identity, the idea that A is A, or of identity through change. This assumption of a rational order in nature goes back to the thought of the philosophers Parmenides of Elea (fl. 500 BC) and Plato (fourth century BC) and is the substance of Aristotle's first principle of logic. Broadly speaking, it is the assumption that nature is subject to law-like behavior; and therefore that the domain of science and technology includes those phenomena that can be reduced to orderly predictable rules, regulations, and laws. Events that can be so described can be controlled because of the simple identity of mathematical relationships. Phenomena that "cannot be foreseen or reproduced at will…[are] essentially beyond the control of science."[11]

The formal structural dependence of this mathematical method on the features of the mechanical arts was beautifully articulated by Descartes in his *Discourse on Method* (1636): "Most of all I was delighted with mathematics, because of the certainty of its demonstrations and the evidence of its reasoning; but I did not understand its true use, and, believing that it was of service only in the mechanical arts, I was astonished that, seeing how firm and solid was its basis, no loftier edifice had been reared thereupon."[12]

The primary example of the law of identity for Descartes was conservation of the quantity of motion measured by the quantity of matter and its speed, $m|v|$. In the late-seventeenth century Newton, Leibniz, English mathematicians Christopher Wren and John Wallis, and Dutch physicist Christiaan Huygens all contributed to the correction of Descartes' law accurately to describe momentum (mv) as the product of mass and velocity rather than speed, and mechanical energy (mv^2) as the product of the mass and the square of the velocity. Everyday machines were models of ideal machines governed and described by the laws of statics and the relational laws of the conservation of mechanical energy and momentum. The form or structure of these laws, based as they were on the law of identity, was thus a model of the universe. Although the conversion of energy from one form to another and, in particular, the conversion of mechanical motion into heat were not fully understood until the nineteenth century, the seventeenth-century laws of impact were nevertheless, for most natural philosophers, models of the

transfer and conservation of motion hypothesized to exist in the ideal world of atoms and corpuscles.

The third assumption, context independence, goes back to Plato's insight that only quantities and context-independent entities can be submitted to mathematical modeling. To the extent that the changing imperfect world of everyday life partakes of the ideal world, it can be described, predicted, and controlled by science just as the physical machine can be controlled by its human operator. Science depends on a rigid, limited, and restrictive structural reality. This limited view of reality is nevertheless very powerful, inasmuch as it allows for the possibility of control whenever phenomena are predictable, regular, and subject to rules and laws. The assumption of order is thus fundamental to the concept of power, and both are integral to the modern scientific worldview.[13]

Although Descartes' plan for reducing complexity in the universe to a structured order was comprehensive, he discovered that the very problem that Aristotle had perceived in the method of Plato was inherent in his own scheme. That problem was the intrinsic difficulty, if not impossibility, of successfully abstracting the form or structure of reality from the tangled web of its physical, material, environmental context. Structures are, in fact, not independent of their contexts, as this third assumption stated, but integrally tied to them. In fact, Descartes was forced to admit, "the application of the laws of motion is difficult, because each body is touched by several others at the same time.…The rules presuppose that bodies are perfectly hard and separable from all others…and we do not observe this in the world." The enormous complexity of things thus inhibits the analysis in terms of simple elements.[14]

Descartes' method exhibits very precisely the fourth or methodological assumption that problems can be broken down into parts and information can then be manipulated in accordance with a set of mathematical rules and relations. Succinctly stated, his method assumes that a problem can be analyzed into parts, and that the parts can be simplified by abstracting them from the complicating environmental context and then manipulated under the guidance of a set of rules.

His method consisted of four logical precepts:

1. To accept as true only what was so clearly and distinctly presented that there was no reason to doubt it.
2. To divide every problem into as many parts as needed to resolve it.

3. To begin with objects simple and easy to understand and to rise by degrees to the most complex (abstraction and context independence).
4. To make so general and complete a review that nothing is omitted.

In Descartes' opinion, this method was the key to power over nature, for these methods of reasoning used by the geometricians "caused me to imagine that all those things which fall under the cognizance of man might very likely be mutually related in the same fashion." By following this method, "there can be nothing so remote that we cannot reach to it, or recondite we cannot discover it."

Descartes' method depended on the manipulation of information according to a set of rules: "Commencing with the most simple and general (precepts), and making each truth that I discovered a rule for helping me to find others,—not only did I arrive at the solution of many questions which I had hitherto regarded as most difficult but…in how far, it was possible to solve them." In the same manner, the operation of a machine depends on the manipulation of its material parts in accordance with a prescribed set of physical operations.

Descartes placed great emphasis on the concept of a plan or form for ordering this information, drawing his examples from the practical problem of city planning: "Those ancient cities which, originally mere villages, have become in the process of time great towns, are usually badly constructed in comparison with those which are regularly laid out on a plain by a surveyor who is free to follow his own ideas." He wished his new ideas to "conform to the uniformity of a rational scheme."[15]

In his *De Cive,* written in 1642, Hobbes had advocated the application of this method of analysis to society:

> For everything is best understood by its constitutive causes. For as in a watch, or some such small engine, the matter, figure, and motion of the wheels cannot well be known except it be taken asunder and viewed in parts; so to make a more curious search into the rights of states and duties of subjects, it is necessary, I say, not to take them asunder, but yet that they be so considered as if they were dissolved.[16]

The fifth assumption shared by seventeenth-century science and the technology of machines was the assumption that sense data are atomic. Data

are received by the senses as minute particles of information. This assumption about how knowledge is received was articulated most explicitly by Hobbes and the British empiricists John Locke and David Hume. According to Hobbes, sense data arise from the motions of matter as it affects our sense organs, directly in the case of taste and touch, or indirectly, through a material medium, as in sight, sound, and smell. These sense data can then be manipulated and recombined according to the rules of free speech: "But the most noble and profitable invention of all other, was that of speech, consisting of names or appellations and their connection whereby men register their thoughts…without which there had been among men neither commonwealth, nor society, nor contract, nor peace." Words are abstractions from reality; sentences or thoughts are connections among words: "The manner how speech serves to the remembrance of the consequence of causes and effects, consists in the imposing of names and the connection of them." Nature cannot be understood unless it is first analyzed into parts from which information can be extracted as sense data: "No man therefore can conceive anything, but he must conceive it in some place and endowed with some determinate magnitude; and which may be divided into parts."[17]

For Hobbes, the mind itself is a special kind of a machine—a calculating machine similar to those constructed by Scottish mathematician John Napier (1550–1617), French philosopher and mathematician Blaise Pascal (1623–1662), Leibniz, and other seventeenth-century scientists. To reason is but to add and subtract or to calculate. "When a man reasoneth, he does nothing else but conceive a sum total, from the addition of parcels; or conceive a remainder, from subtraction of one sum from another; which, if it be done by words, is conceiving of the consequence of the names of all the parts, to the name of the whole; or from the names of the whole and one part to the name of the other part." "In sum, in what matter soever there is place for addition and subtraction, there is also place for reason; and where these have no place, there reason has nothing at all to do.…For reason…is nothing but reckoning, that is adding and subtracting."[18] This view is manifested in twentieth-century information theory that, according to philosopher Martin Heidegger, is "already the arrangement whereby all objects are put in such form, as to assure man's domination over the entire earth and even the planets."[19]

The new definition of reality of seventeenth-century philosophy and science was therefore consistent with, and analogous to, the structure of

machines. Machines (1) are made up of parts, (2) give particulate information about the world, (3) are based on order and regularity (perform operations in an ordered sequence), (4) operate in a limited, precisely defined domain of the total context, and (5) give us power over nature. In turn, the mechanical structure of reality (1) is made up of atomic parts, (2) consists of discrete information bits extracted from the world, (3) is assumed to operate according to laws and rules, (4) is based on context-free abstraction from the changing complex world of appearance, and (5) is defined so as to give us maximum capability for manipulation and control over nature.[20]

THE DOMINATION OF NATURE

Based on these five assumptions about the nature of reality, science, since the seventeenth century, has been widely considered to be objective, value-free, context-free knowledge of the external world. Additionally, as Heidegger argued, Western philosophy since Descartes has been fundamentally concerned with power. "The essence of modern technology lies in enframing;" that is, in the revealing of nature so as to render it a "standing reserve," or storehouse. "Physics, indeed as pure theory," he wrote, "sets up nature to exhibit itself" in such a way as to "entrap" it "as a calculable order of forces."[21]

Both order and power are integral components of the mechanical view of nature. Both the need for a new social and intellectual order and new values of human and machine power, combined with older intellectual traditions, went into the restructuring of reality around the metaphor of the machine. The new metaphor reintegrated the disparate elements of the self, society, and the cosmos torn asunder by the Protestant Reformation, the rise of commercial capitalism, and the early discoveries of the new science.

The domination of nature depends equally on the human as operator, deriving from an emphasis on power and on the human as manager, deriving from the stress on order and rationality as criteria for progress and development. Efficient operation results from the ordered rational arrangement of the components of a system. The mechanical framework with its associated values of power and control sanctioned the management of both nature and society. The management of natural resources depends on surveying the status of existing resources, and efficiently planning their systematic use and replenishment for the long-term good of those who use them.[22]

NEWTONIAN SCIENCE

The world in which we live today was bequeathed to us by Isaac Newton. Twentieth-century advances in relativity and quantum theory notwithstanding, our Western common sense reality is the world of classical physics. The legacy left by Newton was the brilliant synthesis of Galilean terrestrial mechanics and Copernican-Keplerian astronomy. Fundamental in generality, it describes and extends over the entire universe. Classical physics and its philosophy structure our consciousness to believe in a world composed of atomic parts, of inert bodies moving with uniform velocity unless forced by another body to deviate from their straight-line paths, of objects seen by reflected light of varying frequencies, and of matter in motion responsible for all the rich variations in colors, sounds, smells, tastes, and touches we cherish as human beings. In our daily lives, most of us accept these teachings as givens, without much critical reflection on their origins or associated values.

The problem that the mechanization of the world raised for the generation after Descartes and Hobbes was the very issue of the "death of nature." If the ultimate principles were matter and motion—as they were for the first generation of mechanists—or even matter, motion, void space, and force—as they became for Newton—this left unresolved the central issue of explaining the motion of life-forms in a dead cosmos. Like many others, Newton was not satisfied with Descartes' dualistic solution which reduced the human being to a ghost-in-the-machine whose mind could change the direction of, but not initiate, bodily motion, and categorized animals as mere beast machines.

Yet as the most powerful synthesis of the new mechanical philosophy, Newton's *Mathematical Principles of Natural Philosophy,* (1687) epitomized the dead world resulting from mechanism. Throughout the complex evolution of his thought, Newton clung tenaciously to the distinguishing feature of mechanism—the dualism between the passivity of matter and the externality of force and activity.[23]

Mechanism eliminated from the description of nature concepts of spatial hierarchy, value, purpose, harmony, quality, and form central to the older organic description of nature—leaving material and efficient causes—matter and force. Motion was not an organic process but a temporary state of a body's existence relative to the motion or rest of other bodies. The mathematizing tendencies in Newtonian thought which emphasized not the process of

change but resistance to change, the conservation of a body's motion, and the planets and satellites as ideal spheres and point sources of gravitational force, were manifestations of the mechanical philosophers' concern with geometrical idealization, stability, structure, being, and identity, rather than organic flux, change, becoming, and process. In mechanism the primacy of process was thus superseded by the stability of structure.

Completely consistent with this restructuring of the cosmos as passive matter and external force was the division of matter into atomic parts separated by void space. The book of nature was no longer written in symbols, signs, and signatures, but in corpuscular characters. The atomic analysis of matter ultimately became an exemplar for the atomic division of data, problems, and events on a global scale.[24]

Newton's speculations on atomic structure as presented in the 1713 edition of the *Principia* and the queries to the 1706 and 1717 editions of the *Opticks* became a foundation for eighteenth-century experimental philosophers, who wished to complete the task of reducing known phenomena to simple laws which—like the law of gravitation—would quantify other mechanical, chemical, electrical, and thermal observations. Moreover, its conceptual framework, emphasizing external force and passive matter divided into re-arrangeable components, could provide a subtle sanction for the domination and manipulation of nature necessary to progressive economic development. If eventually the religious framework providing for God's constant care and for the attainment of human grace were removed, as it was in the eighteenth century, the possibilities for intellectual arrogance toward nature would be strengthened.[25]

The mechanistic view of nature, developed by the seventeenth-century natural philosophers and based on a Western mathematical tradition going back to Plato, is still dominant in science today. This view assumes that nature can be divided into parts and that the parts can be rearranged to create other species of being. "Facts" or information bits can be extracted from the environmental context and rearranged according to a set of rules based on logical and mathematical operations. The results can then be tested and verified by resubmitting them to nature, the ultimate judge of their validity.

Between 1500 and 1700 an incredible transformation took place. A "natural" point of view about the world in which bodies did not move unless activated, either by an inherent organic mover or a "contrary to nature"

superimposed "force," was replaced by a non-natural non-experiential "law" that bodies move uniformly unless hindered. The "natural" perception of a geocentric earth in a finite cosmos was superseded by the "non-natural" commonsense "fact" of a heliocentric infinite universe. A subsistence economy in which resources, goods, money, or labor were exchanged for commodities was replaced in many areas by the open-ended accumulation of profits in an international market. Living animate nature died, while dead inanimate money was endowed with life. Increasingly capital and the market assumed the organic attributes of growth, strength, activity, pregnancy, weakness, decay, and collapse, obscuring and mystifying the new underlying social relations of production and reproduction that made economic growth and progress possible. Nature, women, blacks, and wage laborers were set on a path toward a new status as "natural" and as human resources for the modern world system. Perhaps the ultimate irony in these transformations was the new name given them: rationality.[26]

Twentieth-century logical positivism, the basis for scientific knowledge, assumes that only two types of statements lead to truths about the natural world: mathematical (or logical statements) of the form a = a, and empirically verifiable statements. Mathematical formalism provides the criterion for rationality and certainty, nature the criterion for empirical validity and acceptance or rejection of the theory. Natural science has thus become the model for knowledge.

Modern science is widely assumed to be objective, value-free, context-free knowledge of the external world. The greater the extent to which the sciences can be reduced to this mechanistic mathematical model, the more legitimate they become as sciences. Thus the reductionist hierarchy of the validity of the sciences first proposed in the nineteenth century by French positivist philosopher August Comte (1798–1857) is still widely assumed by intellectuals, the most mathematical and highly theoretical sciences occupying the most revered position.[27]

BIOTECHNOLOGY

Biotechnology, the mechanistic worldview's latest child, epitomizes its reading of nature as made up of atomistic parts—genes—that can be combined and manipulated to form more complex units of life. Information encoded

in the DNA of each species can be manipulated to create new books in the library of nature. Genetic sequences are arrayed in ever larger units of information—sentences, books, and libraries. Consistent with the presuppositions of mechanistic science, genetics assumes that:[28]

- DNA is composed of the four bases: adenine, thymine, cytosine, and guanine that are the molecular "letters" that form the words needed to create the many hundred-word sentences that comprise the gene—the universal building block of life.
- Genes are discrete bits of information assembled into "books" of chromosomal messages, "libraries" of bacterial clones, and data-banks to be edited, revised, and reorganized.
- Because the gene is the basic building block of life, a gene will maintain its identity through change when inserted into the matter of another species and yet continue to function as it did in the original.
- Individual genes can be studied and analyzed in models before being assembled into new combinations.
- Genetically-engineered organisms can be introduced into new environmental contexts with little or no risk since the laboratory and the fields are one and continuous.

Genetically-engineered food is created by sniping genes from one life form and implanting them in another. Companies such as Calgene, Monsanto, Upjohn, Pioneer, and DeKalb, "improve" the genes of cantaloupes and squash to resist viruses, create corn that requires fewer herbicides, potatoes with higher starch content, bell peppers that stay fresh longer, and rice with higher protein value.[29]

Calgene's "MacGregor" tomato (so named for its warm Farmer MacGregor and Peter Rabbit feeling) was engineered by inserting a copy of the "rotting" gene backwards, allowing the tomato to stay in the field a few days longer and to be picked pink, or vine-ripe, rather than green. The process of implanting this "antisense" gene was patented, so that in the future the company could collect royalties, not only on bioengineered tomatoes, but on any other crop altered by the same technique. Unfortunately for investors, the Flavr-Savr lacked the taste of a garden ripened tomato and Calgene lost value in the marketplace.[30]

Corn is another crop that biotechnology companies such as Monsanto and Syngenta (formerly a branch of Novartis) are engineering as a new

marketplace commodity. Genetically modified organisms (GMOs) are crop varieties that are resistant to pests, salinization, and drought. A problem arises, however, over the question of genetic pollution—a potential clash between genes versus ecosystems and genetics versus ecology. In some cases, engineered genes (transgenes) may cross over into other corn plants, via pollen from the modified plant that mixes with unmodified plants, thus "contaminating" them with engineered genes. In this way the evolutionary diversity of corn in its center of origin in Mexico might become polluted with new genetically engineered varieties not heretofore found in nature. Such a situation apparently did occur in Mexico and could be of concern for other crop cradles (such as rice, barley, wheat, potatoes, and so on) which have been sources of diversity for plant breeders responding to catastrophic diseases (such as the Irish potato blight). In the case of "polluted plants," the transgenes do not decline over time, but instead replicate their genetic information repeatedly.[31]

The ownership and patenting of escaped transgenes likewise presents problems. A western Canadian farmer, Percy Schmeiser, found that his canola crop was contaminated by Monsanto's engineered canola grown on an adjacent field. Monsanto's lawsuit alleged that Schmeiser had infringed on its patent by growing its canola without a license. Schmeiser, who had no prior knowledge of Monsanto's canola, contended that Monsanto's canola had contaminated his quarter-century old pure seed and was therefore liable for property damage. The judge ruled that it did not matter how the contamination occurred (whether by purchase, theft, or accident, including wind, birds, or floods) once the GMOs appeared in Schmeiser's field, those seeds and plants were Monsanto's property. They had been "invented" by Monsanto. The case, which was appealed to the Canadian Supreme Court, raised questions of inventing, owning, and patenting life forms. What are the implications of "inventing" new life forms, including animals and human beings, and who owns those new life forms?[32]

Cloning of animals represents a further step in the manipulation of life. The cloning of "Dolly" the ewe, in 1996, seemed to herald a new era in commodifying animals and plants. Scottish scientist Ian Wilmut took an adult cell from a ewe's mammary gland and created an embryo, reversing the process of aging to one of birth. An adult cell was now capable of reiterating dormant genetic instructions lost during the aging process and replicating anew a single individual. Dolly was a carbon copy of her mother. Dolly's cells later exhibited

premature aging and she was put to death in 2003, representing a temporary setback to hopes for immortality. What was new was that mammals could now be cloned, not from undifferentiated embryonic cells, but from adult cells, ensuring that the final physical product was already known.[33]

While bioengineered domesticated plants and animals might be controlled to some degree, transgenic wild animals are not so easily managed. Transgenic salmon are created by introducing genes from Ocean Pout fish that promote growth in the salmon. Such "Frankenfish" seem to biotechnologists to be the answer to feeding growing populations with healthy food, without depleting ocean supplies. Environmentalists, on the other hand, fear that transgenic fish might escape their ocean breeding pens, mate with wild fish and contaminate the wild salmon gene pool. In fact, one study showed that not only did wild salmon prefer to mate with transgenic fish, but that the offspring died young, raising fears that wild fish would ultimately die out.[34]

The Human Genome Program aims to map and sequence the human genetic blueprint—the nucleotide bases of the genes distributed on the twenty-two pairs of human chromosomes, plus the two sex-linked X and Y chromosomes. The long DNA molecule contained in each chromosome comprises four nucleotide bases in various combinations of order. The sequence of bases in the twenty-three pairs of chromosomes of the human genome reveals its genetic blueprint. According to biotechnologists, unraveling that order and the information encoded within it could result in untold benefits for humanity.[35]

But the Human Genome Program goes beyond humans to include the genomes of other key species. The information gleaned is expected to provide comparisons among species. New technologies for discovering the sequencing and new methods of handling the immense amount of resultant data are part of the project. The technologies devised will then be applied to the manipulation of nature on a wider scale.[36]

Environmental scientists, cognizant of the organismic worldview of ecology, warn of unanticipated consequences from bioengineering and from introducing new organisms into nature:[37]

- Because of web-like interconnections, genetically modified organisms might interact with the environment in unanticipated ways by colonizing surrounding ecosystems.

- Because the whole is greater than the sum of the parts, even if only one in 100 introductions became established a single species could disrupt the whole.
- Because non-human nature is a dynamic and responsive actor, introductions (such as chemicals and GMOs) whose effects are not initially apparent can trigger resistant mutants.
- Because of the primacy of ecological process, released organisms (such as new crops or pollutant-degrading bacteria) will have to be engineered for, rather than against, successful spreading within the ecosystem in accordance with the laws of ecology and plant succession.
- Because humans and non-human nature are a unity, genetic engineers, ecologists, and ordinary citizens must participate with nature as partners in survival (rather than masters of the planet), in considering obligations and in evaluating risks.

Can the new technology be regulated or will it go underground in secret laboratories around the world? Who benefits and who will pay the costs? Should research with unanticipated ecological side-effects be allowed to proceed? These difficult ethical questions are only the beginning of the implications of the newest form of mechanistic science.

THE PRECAUTIONARY PRINCIPLE

As a result of the increasing complexity of ecological problems and the uncertainty of the health effects of introducing new chemicals and genetically modified organisms into human bodies and ecosystems, scientists and policy makers have developed the precautionary principle. In 1998 the principle was formulated as follows: "When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically." The principle includes four components:

1. Taking preventive action in the face of uncertainty.
2. Shifting burdens onto proponents of potentially harmful activities.
3. Exploring a wide range of alternatives to possibly harmful actions.
4. Increasing public participation in decision making.[38]

Precaution deals explicitly with the intersection between science and public policy. Scientifically, it is sensitive to the limitations of scientific prediction in the face of ecological complexity. Politically, it is sensitive to public participation in policy formation. It is particularly relevant to problems such as global warming, nuclear weapons testing and nuclear power, chemical additives and hormones in foods, and the introduction of pesticides and GMOs into the environment. The implementation of the precautionary principle depends on the willingness of scientists to think beyond narrow research problems and methodologies based solely on quantification and to take part in policy debates. It depends on an involved citizenry taking on the responsibility of learning and thinking about ecological and human health problems and of participating in the democratic processes of action and debate.

CONCLUSION

Although the mechanistic analysis of nature has dominated the Western world since the seventeenth century (recently manifested in biotechnology), the organismic perspective has by no means disappeared. It has remained as an important underlying tension, surfacing in such variations as the Romanticism, American transcendentalism, the German Nature philosophers, and the early philosophy of Karl Marx. The basic tenets of the organic view of nature have reappeared in the twentieth century in the process philosophy of Alfred North Whitehead, the ecology movement of the 1970s, and David Bohm's holomovement (see chapters 3 and 4). Some philosophers have argued that the two frameworks are fundamentally incommensurable. Others argue that a reassessment of the underlying metaphysics and values historically associated with the mechanistic worldview may be essential for a viable future.

The mechanistic worldview continues today as the legitimating ideology of industrial capitalism and its inherent ethic of the domination of nature. Mechanistic thinking and industrial capitalism lie at the root of many of the environmental problems discussed in chapter 1. The egocentric ethic associated with this worldview, however, has been challenged, not only by the precautionary principle, but by the ecocentric ethic of the ecology movement, the multicultural ethics of the social justice movement (see chapter 3), and by

the worldview of deep ecology and the new sciences of chaos and complexity (see chapter 4).

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3

ENVIRONMENTAL ETHICS AND POLITICAL CONFLICT

In his *Nichomachean Ethics,* Aristotle noted that "all knowledge and every pursuit aims at some good."[1] But whether this is an individual, social, or environmental good lies at the basis of many real world ethical dilemmas. Egocentric, homocentric, and ecocentric ethics often underlie the political positions of various interest groups engaged in struggles over land and natural resource uses. These ethics are the culmination of sets of associated political, religious, and ethical trends developing in Western culture since the seventeenth century. In recent years, however, new ethical formulations such as multicultural ethics and partnership ethics have been proposed to resolve environmental problems. Conflicts of interest among private individuals, corporations, government agencies, and environmentalists often reflect variations of the ethical approaches outlined in this chapter. Thinking about environmental problems in terms of this taxonomy helps us to understand the unexpressed assumptions behind political conflicts over the environment and how they might be resolved in practice.

These ethical differences are also at the root of some of the disagreements among radical environmental theorists and activists detailed in subsequent chapters. An egocentric ethic (grounded in the self) for example, is historically associated with the rise of *laissez faire* capitalism and the mechanistic worldview discussed in the previous chapter, and is the ethic of mainstream

industrial capitalism today. A homocentric ethic (grounded in the social good) underlies those ecological movements whose primary goal is social justice for all people, such as social ecologists, left Greens, social and socialist ecofeminists, many Third World and minority environmentalists, and the mainstream sustainable development movement. An ecocentric ethic (grounded in the cosmos, or whole ecosystem) guides the thinking of most deep ecologists; many spiritual ecologists, Greens, and ecofeminists; organic farmers and bioregionalists; and most indigenous peoples' movements. Multicultural and partnership ethics are particularly relevant to the environmental justice and global environmental movements. The following discussion is not an exhaustive description of ethics. It does not discuss valuable insights into ethics developed by thinkers such as Aristotle, Aquinas, Kant, Eastern philosophers, or feminist philosophers (on the latter two see chapters 4, 5, and 8). Rather it is an effort to develop some of the important ethical categories relevant to the environmental topics discussed in this book (see Table 3.1).

Environmental ethics are a link between theory and practice. They translate thought into action, worldviews into movements. Ideas generated from social conditions must be transformed into behaviors in order to change those conditions. Behaviors are thus guided by an underlying ethic. Religious beliefs, according to anthropologist Clifford Geertz, establish powerful moods and motivations that translate into social behaviors. Similarly, worldviews (whether mechanical or organic) asserts Charles Taylor, have powerful, associated sets of values that can override social changes and maintain existing social hegemony or be undermined, weakened, and transformed by social change and social movements. Ideas are thus translated into bodily motions that affect production and reproduction.[2]

EGOCENTRIC ETHICS

An egocentric ethic is grounded in the self. It is based on an individual ought focused on individual good. In its applied form, it involves the claim that what is good for the individual will benefit society. The individual good is thus prior to the social good which follows from it as a necessary consequence. An egocentric ethic's orientation does not derive from selfishness or narcissism, but rather is based on a philosophy that treats individuals (or private corporations) as separate, but equal, social atoms. Historically, the egocentric

ethic rose to dominance in Western culture during the seventeenth century. As the classic ethic of liberalism and *laissez faire* capitalism, in America it has been the guiding ethic of private entrepreneurs and corporations whose primary goal is the maximization of profit from the development of natural resources. Only the "silken bands of mild government", as Hector St John de Crèvecoeur put it in 1782, inhibit individual actions. Industry is "unfettered and unrestrained, because each person works for himself."[3]

Environmentally, an egocentric ethic permits individuals (or corporations) to extract and use natural resources to enhance their own lives and those of other members of society, limited only by the effects on their neighbors. Traditionally, the use of fire, common water sources, and rivers were regulated by laws. Under common law during the American colonial period, for example, one could not obstruct a river with a dam since this interfered with its natural course and reduced the privileges of others living along it. By the late eighteenth century, however, individual privileges increasingly prevailed when profits were at stake. Entrepreneurs could erect dams on the grounds that "the public whose advantage is always to be regarded, would be deprived of the benefit which always attends competition and rivalry."[4]

Egocentric ethics often reflect the Protestant ethic. An individual is responsible for his or her own salvation through good actions. During the seventeenth century, American Christianity moved away from the doctrine of the early Puritans that only the elect would be saved, toward the Arminian doctrine that any individual could assure his or her own salvation through leading an ethical life.[5] In the seventeenth century, the Protestant ethic dovetailed with the Judeo-Christian mandate of Genesis I, 28: "Be fruitful and multiply, and replenish the earth and subdue it." From an environmental perspective, as historian Lynn White Jr. argues, the Judeo-Christian ethic legitimated the domination of nature.[6] Early economic development in America was reinforced by this biblical framework. As the *Arabella*, bearing the first Puritan settlers of the Massachusetts Bay Colony, left England for the New World in 1629, John Winthrop quoted the Genesis I passage.[7] In justifying expansion into Oregon in 1846, John Quincy Adams asserted that the objectives of the United States were to "make the wilderness blossom as the rose; to establish laws, to increase, multiply, and subdue the earth, which we are commanded to do by the first behest of the God Almighty."[8] That same year, Thomas Hart Benton, in his famous address to the Twenty-ninth Congress, insisted

Table 3.1

Grounds for Environmental Ethics

Self: Egocentric		Society: Homocentric		Cosmos: Ecocentric		Relation: Eco-community	
Self-Interest	**Religious**	**Utilitarian**	**Religious**	**Eco-Scientific**	**Eco-Religious**	**Partnership/ Multicultural**	**Religious**
Thomas Hobbes	Judeo-Christian ethic	J.S. Mill	John Ray	Aldo Leopold	American Indians	Carolyn Merchant	Rosemary Radford Ruether
John Locke	Arminian "heresy"	Jeremy Bentham	William Derham	Rachel Carson	Buddhists	Val Plumwood	Sallie McFague
Adam Smith		Gifford Pinchot	René Dubos	Deep ecologists	Spritual feminists	Riane Eisler	Ivone Gebara
Thomas Malthus		Peter Singer	Robin Attfield	Restoration ecologists	Spiritual greens	Alison Jaeger	Ecotheologians
Garrett Hardin		Barry Commoner		Biological control	Process philosophers	J. Baird Callicott	Panentheists
		Murray Bookchin		Sustainable agriculture		Chris Cuomo	
		Left Greens				Karen Warren	
		Social ecofeminists				Ecojustice movement	

Grounds for Obligation

Self: Egocentric		Society: Homocentric		Cosmos: Ecocentric		Relation: Eco-community	
Self-Interest	**Religious**	**Utilitarian**	**Religious**	**Eco-Scientific**	**Eco-Religious**	**Partnership/ Multicultural**	**Religious**
Maximization of individual self-interest. What is good for the individual will benefit society as a whole Mutual coercion, mutually agreed upon	Authority of God Genesis I Dominion over nature Protestant ethic Individual salvation	Greatest good for the greatest number of people Social justice Duty to other humans	Stewardship by humans as God's care-takers Golden Rule Genesis II	Rational scientific belief system Laws of ecology Unity, stability, diversity, harmony of ecosystem Balance of nature	Faith that all living and nonliving things have value Duty to whole environment Human and cosmic survival Primacy of process	Complexity of nature/culture Responsibility to women, minorities, and non-human nature Cultural diversity and biodiversity Sustainable communities Environmental justice	Reverence for all life Justice for all races, classes, and the earth Spiritual, sustainable communities

Metaphysics

Mechanism	Both Mechanism and Organicism	Organicism (Holism)	Choas and Complexity Theories

that the white race had "alone received the divine command to subdue and replenish the earth: for it is the only race that…hunts out new and distant lands, and even a New World, to subdue and replenish."[9] Similar Biblical passages reinforced God's command to transform nature from a wilderness into a civilization. Reverend Dr. Dwinell's sermon, commemorating the joining of the Central Pacific and Union Pacific railroads in 1869, quoted the Bible as a sanction for human alteration of the natural landscape. "Prepare ye the way of the Lord, make straight in the desert a highway before our god. Every valley shall be exalted, and every mountain and hill shall be made low and the crooked shall be made straight and the rough places plain."[10]

Egocentric ethics as a basis for environmental policy are rooted in the philosophy of seventeenth-century political philosopher Thomas Hobbes. In turn Hobbes' approach forms the ground for the environmental ethic of ecologist Garrett Hardin, whose "Tragedy of the Commons" (1968) influenced environmental policy in the 1970s.[11] For Hobbes, humans are basically competitive. In *Leviathan* (1651), Hobbes asserts that people are by nature unfriendly, hostile, and violent. In the state of nature, everyone has an equal right to everything, for "Nature has given all to all." But for Hobbes, nature is not a Garden of Eden or a Utopia in which everyone shares its fruits, as earlier communal theories of society held. Instead, everyone is competing for the same natural resources. In *De Cive* (1647), he wrote, "For although any man might say of every thing, this is mine, yet he could not enjoy it, by reason of his neighbor, who having equal right and equal power, would pretend the same thing to be his."[12] Thus, because of competitive self-interest, the commons could not be shared, but must be fought over.

By Hobbes' time, the English commons were losing their traditional role as shared sources of life-giving grass, water, and wood to be used by all peasants, as had been the case in feudal times. Instead, they could be owned and enclosed by individual landlords who could use them to graze sheep for the expanding wool market. In fact, if lords did not compete, they could lose their lands and fortunes and be ridiculed by their peers. "For he that should be modest and tractable and perform all he promises," wrote Hobbes, "…should but make himself a prey to others and procure his own certain ruin."[13]

The commons was thus like a marketplace or a battleground in need of law and order. The solution to the disorder that prevailed in the state of nature was the social contract. By common consent, people gave up their freedom

to fight and kill and accepted governance by a sovereign out of fear. Through the rational acceptance by each citizen of a set of rules for individual ethical conduct, social order, peace, and control could be maintained. The state was thus an artificial ordering of individual parts, a Leviathan, "to which we owe…our peace and defense."[14] Hobbes' egocentric ethic therefore was based on the assumption that human beings, as rational agents, could overcome their "natural" instincts to fight over property.

Garrett Hardin's "Tragedy of the Commons" and his "lifeboat ethics" are both grounded in this egocentric ethic. Like Hobbes, Hardin's (unstated) underlying assumptions are that people are naturally competitive, that capitalism is the "natural" form of economic life, and that the commons is like a marketplace. Hardin argues that individuals tended to graze more and more sheep on the commons because the economic gain was +1 for each sheep. On the other hand, the cost of overgrazing (environmental deterioration) was much less than −1, because the costs were shared equally by all. Thus there was no incentive to reduce herds. In the modern analogy, the seas and air are a global commons. Resource depletion and environmental pollution of the commons are shared by all, hence there is no incentive for individuals or nations to control their own exploitation. The costs of acid rain and chlorofluorocarbons in the air, oil spills and plastics in the oceans, and depletion of fish, whales, and seals are shared equally by all who fish, breathe, and live. The solution, for Hardin as for Hobbes, is mutual coercion, mutually agreed upon. People, corporations, and nation states voluntarily consent to rational regulation of resources.[15]

Similarly Hardin's "Living on a Lifeboat" (1974) is an egocentric ethic. When an overloaded boat capsizes, there will be insufficient lifeboats to save all. Those individuals who are saved are those who are strong enough to help themselves. When a population outstrips its food resources, some individual nations will institute population control policies and some will not. Through a policy of triage, such as that developed for wartime injury victims, selective help should be offered.[16] Under triage, limited wartime medical resources should be used first to help those with severe injuries who can survive only with aid and second to those with moderate injuries who would survive anyway. Those with massive fatal injuries who would die despite medical aid should not be helped beyond pain reduction. Similarly, developed nations with food surpluses should help developing nations which voluntarily agree

to control population growth. Those who cannot or will not agree to population control policies should not receive assistance. The lifeboat ethic is thus an egocentric ethic of individual choice based on human reason. Nations, like individual atoms, are rational decision-makers who can decide whether or not to save themselves. Having arrived at that choice through reason, they voluntarily submit to coercion, i.e., population control, in order to save their countries.[17]

Egocentric ethics are rooted in the mechanistic science of the seventeenth century. Mechanism is based on several underlying assumptions consistent with liberal social theory:

1. Mechanistic science is based on the assumption that matter is made up of individual parts. Atoms are the real components of nature, just as individual humans are the real components of society.
2. The whole is equal to the sum of the individual parts. The law of identity in logic, or a = a, is the basis for the mathematical description of nature. Similarly, society is the sum of individual rational agents, as in Hobbes' depiction of the body of the sword-carrying sovereign as made up of the sum of the individual humans who have submitted themselves to his rule.
3. Mechanism involves the assumption of context independence. Real objects obey the laws of falling bodies and gravitation only when environmental contexts, such as air resistance and friction, are stripped away and masses act as point centers of force. In society, rules and laws are obeyed by a populace comprising equal individuals, stripped of particularity and difference.
4. Change occurs by the rearrangement of parts. In the billiard ball universe of mechanistic scientists, the initial amount of motion (or energy) introduced into the universe by God at its creation is conserved and simply redistributed among the parts as they come together or separate to form the bodies of the phenomenal world. Similarly, individuals in society associate and dissociate in corporate bodies or business ventures.
5. Mechanistic science is often dualistic. Philosophers such as René Descartes and scientists such as Robert Boyle and Isaac Newton posited a world of spirit separate from that of matter. Nature, the human body, and animals could all be described, repaired, and con-

> trolled, as could the parts of a machine, by a separate human mind acting according to rational laws. Similarly, in the rhetoric of the founders of the American constitution, democratic society is a balance of powers as in a pendulum clock, and government operates as do the well-oiled wheels and gears of a machine controlled by human reason. Mind is separate from and superior to body; human society and culture are separate from and superior to nonhuman nature. Just as mechanistic science gives primacy to the individual parts that make up a corporeal body, so egocentric ethics give primacy to the individual humans who make up the social whole.

An egocentric ethic may be identified as the underlying ethic of private developers in current environmental disputes. Here the goals of entrepreneurs dedicated to promoting the individual's good conflict with those of government agencies charged with preserving the public good, and with those of environmentalists defending the good of nonhuman nature. Thus discharges of toxic chemicals by computer chip manufacturers in Silicon Valley on the San Francisco peninsula conflict with the regulatory mandates of water quality control agencies protecting groundwater quality. The efforts of Dow Chemical Corporation to locate a chemical processing plant in the Suisuin Marsh area of the San Francisco Bay conflict with the public interest ethics of air and water quality control boards, and with the ecocentric ethics of environmentalists who wish to preserve the marsh as habitat for the endangered salt marsh harvest mouse.

From an environmental point of view, the egocentric ethic that legitimates *laissez faire* capitalism has a number of limitations. Because egocentric ethics are based on the assumption that the individual good is the highest good, the collective behavior of human groups or business corporations is not a legitimate subject of investigation. Second, because it includes the assumption that humans are "by nature" competitive and capitalism is the "natural" form of economics, ecological effects are external to human economics and cannot be adjudicated. In the nineteenth century, however, the first of these problems was dealt with through a new form of environmental ethics—the homocentric or utilitarian ethic. In the twentieth century, the problem of internalizing ecological externalities was addressed through the development of ecocentric ethics.

HOMOCENTRIC ETHICS

A homocentric (or anthropocentric) ethic is grounded in society. A homocentric ethic underlies the social interest model of politics and the approach of environmental regulatory agencies that protect human health. The utilitarian ethics of Jeremy Bentham (1789) and John Stuart Mill (1861), for example, advocate that a society ought to act in such a way as to insure the greatest good for the greatest number of people. The social good should be maximized, social evil minimized. For both Bentham and Mill, the utilitarian ethic has its origins in human sentience. Feelings of pleasure are good, those of pain are evil and to be avoided. Because people have the capacity for suffering, society has an obligation to reduce suffering through policies that maximize social justice for all.[18]

Utility, according to Bentham, "is that property in any object whereby it tends to produce benefit, advantage, good, or happiness. . . or to prevent the happening of mischief, pain, evil, or unhappiness." For Bentham the interest of the community is the "sum of the interests" of the individuals that compose it and actions are good in conformity with their tendency to "augment the happiness of the community." While Bentham spoke of the community and the sum of the individual interests that make up this "fictitious body," Mill cast his arguments in terms of the "general interests of society," "the interest of the whole," and "the good of the whole."[19] Each individual, he assumed, is endowed with feelings that promote the general good. "Utilitarian morality recognizes in humans the power of sacrificing their own greatest good for the good of others." Each person should associate his or her happiness with "the good of the whole." People therefore have primary duties and obligations to other humans, not just to themselves.[20] "Actions," he said, "are right in proportion to as they tend to promote happiness; wrong as they tend to produce the reverse of happiness."[21]

In developing an ultimate sanction for the principle of utility, Mill went beyond the simple prohibitions against killing and robbery in the Mosaic decalogue and the Hobbesian idea that it is "natural" for individuals freely to kill each other unless they give up that right and receive protection from a sovereign. He asked, "I feel I am bound not to rob or murder, betray or deceive; but why am I bound to promote the general happiness?" The answer lies in education. The more "education and general cultivation," the more powerful

is the enforcement. Education overcomes selfish motives and creates deeply rooted feelings of unity with other humans. Moral feelings are not innate, but acquired. Mill claimed that a sequence of ethical standards develops as "civilization" advances and mankind is "further removed from a state of savage independence." The spirit of the utilitarian ethic is expressed in the Golden Rule. "'To do as you would be done by,' and 'To love your neighbor as yourself,'" Mill wrote, "constitute the ideal perfection of utilitarian morality."[22]

As in egocentric ethics, this homocentric ought reflects a religious formulation. Humans are stewards and caretakers of the natural world. Scholars such as ecologist René Dubos and philosophers John Passmore and Robin Attfield have pointed out that the Bible contains numerous passages that countervene the stark domination ethic of Genesis 1.[23] In Genesis 2, thought to be derived from a different historical tradition than Genesis 1, the animals are helpmates for humans. God, according to Dubos, "placed man in the Garden of Eden not as a master but rather in a spirit of stewardship."[24] Like egocentric ethics, stewardship ethics were enunciated by seventeenth-century scientists and theologians concerned about the atheistic implications of mechanism as formulated by Hobbes. John Ray and William Derham developed a theology of stewardship consistent with Newtonian science, human progress, and the management of nature for human benefit. They quote New Testament passages, such as Matthew (25:14): "That these things are the gifts of God, they are so many talents entrusted with us by the infinite Lord of the world, a stewardship, a trust reposed in us; for which we must give an account at the day when our Lord shall call." Additionally, in Luke 16:2, God said to the unfaithful steward, "Give an account of thy stewardship, for thou mayest no longer be steward." In stewardship ethics, God as the wise conservator and superintendent of the natural world made humans caretakers and stewards in his image. Stewardship ethics, however, are fundamentally homocentric. Humans must manage nature for the benefit of the human species, not for the intrinsic benefit of other species.[25]

Like egocentric ethics, homocentric ethics are consistent with the assumptions of mechanistic science, especially as extended by nineteenth century-scientists to include the fields of thermodynamics, hydrology, and electricity and magnetism. Scientific experts could use these laws for the efficient management of natural resources. Yet certain assumptions that characterize later ecocentric ethics are melded with the homocentric. Both nature

(as in Darwinian evolution) and society are described in terms of organic metaphors. As Supreme Court Justice Oliver Wendell Holmes Jr. put it in 1903, "In modern societies, every part is so organically related to every other part, that what affects any portion must be felt more or less by all the rest."[26]

In addition to the utilitarian philosophers, Marxists espouse a homocentric ethic. Inasmuch as Marx's goals were to better the human condition by using science and technology to meet human needs for food, clothing, shelter, and fuel and to overcome the necessities imposed by nature, his philosophy is clearly human centered. Although Marx was fully cognizant of the disruptions of nonhuman nature by capitalist industries, post-Marxist social ecologists, such as Barry Commoner and Murray Bookchin, are more sensitive to alternatives that mitigate problems of resource depletion and pollution. They see scientific research as developing out of social priorities and hierarchical industrial and university relations. They offer technologies and social structures designed to keep human needs in balance with natural cycles and with energy requirements. A homocentric ethic guides choices concerning which research projects to fund, which technologies to implement, and which processes to use for decision-making. Such an ethic sets up the fulfillment of human needs as a priority, but gives full consideration to non-human nature in the process of decision making. Homocentric ethics underlie the politics of the social ecologists of chapter 6.

What are some examples of homocentric ethics and political conflict? A particularly salient example is the building of dams for water and hydraulic power for cities and states, the controversy in the early twentieth century over whether to dam Hetch Hetchy valley in Yosemite Park as a source for water and power for the city of San Francisco being a case in point. Gifford Pinchot, arguing for San Francisco, pointed out that a water supply for the city was a greater good for a greater number of people than leaving the valley in the state of nature for a few hikers and nature lovers. John Muir, on the other hand, viewed the valley as one of God's cathedrals and the proponents of the dam as temple destroyers, an ethic based on the valley's intrinsic right to remain as created. Today water control agencies are quite explicit in their claim that they must consider the greatest good for the greatest number of people in distributing water to their customers in time of shortages.[27]

In 1979 environmentalist Mark Dubois chained himself to a rock to prevent California's Stanislaus River from being dammed and losing its right

to remain free. "All the life of this canyon, its wealth of archaeological and historical roots to our past, and its unique geological grandeur are enough reasons to protect this canyon just for itself," he wrote to the Army Corps of Engineers. "But in addition, all the spiritual values with which this canyon has filled tens of thousands of folks should prohibit us from committing the unconscionable act of wiping this place off the face of the earth." This controversy may be viewed as a conflict among interest groups with different underlying ethics. Farmers and corporate agribusiness ventures, whose egocentric ethics promote the individual's good, along with federal water control agencies, whose homocentric ethics see water development as the greatest good for the greatest number, conflict with the ecocentric ethics of environmentalists, who support the river's intrinsic right to remain wild.[28]

Dilemmas such as these point up one of the main problems of both egocentric and homocentric ethics—their failure to internalize ecological externalities. Ecological changes and their long-term effects are outside the human/society framework of these ethics. The effects of ecological changes such as salinity build-up in farming soils that use the dam's water, or the loss of indigenous species when a valley is flooded, are not part of the human-centered calculus of decision making. One approach offered by ethicists is to extend homocentric ethics to include other sentient species. Animal liberationists Peter Singer and Tom Regan, for example, extend the pleasure-pain principle of Bentham and Mill to animals, arguing that conditions for the well-being of animals should be maximized, while conditions that lead to pain such as over-crowded conditions, liquid diets, and cruel experimentation should be minimized.[29] A similar extension of stewardship ethics to include nonhuman species and future human beings is made by Robin Attfield.[30] An alternative, however, is to formulate a radically different form of environmental ethics—ecocentric ethics.

ECOCENTRIC ETHICS

An ecocentric ethic is grounded in the cosmos. The whole environment, including inanimate elements, rocks, and minerals along with animate plants and animals, is assigned intrinsic value. The eco-scientific form of this ethic draws its ought from the science of ecology. Recognizing that science can no longer be considered value-free, as the logical positivists of the early-

twentieth century had insisted, proponents of ecocentric ethics look to ecology for guidelines on how to resolve ethical dilemmas. Maintenance of the balance of nature and retention of the unity, stability, diversity, and harmony of the ecosystem are its overarching goals. Of primary importance is the survival of all living and non-living things as components of healthy ecosystems. All things in the cosmos as well as humans have moral considerability.

Modern ecocentric ethics were first formulated by Aldo Leopold during the 1930s and 1940s and published as "The Land Ethic," the final chapter of his posthumous *A Sand County Almanac* (1949). Some of Leopold's inspiration for the land ethic seems to have derived from Mill's *Utilitarianism*. Like Mill—who wrote about the "influences of advancing civilization," the "removal from the state of savage independence," and the utilitarian Golden Rule as superseding the basic prohibitions against robbing and murdering—Leopold thought ethics developed in sequence. "The first ethics," he wrote, "dealt with the relation between individuals; the Mosaic Decalogue is an example. Later accretions dealt with the relation between the individual and society. The Golden Rule tries to integrate the individual to society." The land ethic, he argued, extends the sequence a step further. It enlarges the bounds of the community to include "soils, waters, plants, and animals, or collectively, the land." It "changes the role of *homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow members and also respect for the community itself."[31] In putting the land ethic into practice, Leopold urged that each question be judged according to what is both ethically and aesthetically right. Perhaps influenced by Mill's phraseology that "actions are right in proportion as they tend to promote happiness; wrong as they tend to produce the reverse of happiness," Leopold wrote: "A thing is right when it tends to preserve the integrity, beauty, and stability of the biotic community. It is wrong when it tends otherwise." Like Mill who argued for the importance of education in creating obligations toward other people, Leopold argued that in order to overcome economic self-interest, ethical obligations toward the land must by taught through conservation education.[32]

Environmental historian Roderick Nash has elaborated Leopold's land ethic in an article "Do Rocks Have Rights?" Rocks are part of the pyramid of animate and inanimate things governed by the laws of ecology. Even though rocks are not sentient like animals, rocks as well as plants can be assigned

interests that can be represented and adjudicated. Yet such a concept might still be used to protect rocks in the interest of humans. Pushing it further, Nash argues, we can "suppose that rocks, just like people, do have rights in and of themselves. It follows that it is the rock's interest, not the human interested in the rock, that is being protected." Other cultures such as Native Americans, Zen Buddhists, and Shintos, he points out, assume that rocks are alive—a mystical religious belief not usually held by Western philosophers and scientists.[33]

Ecocentric ethics are rooted in a holistic, rather than mechanistic, metaphysics.[34] The assumptions of holism are:

1. Everything is connected to everything else. The whole qualifies each part; conversely, a change in one of the parts will change the other parts and the whole. Ecologically, this has been illustrated by the idea that no part of an ecosystem can be removed without altering the dynamics of the cycle. If too many changes occur, an ecosystem collapses. Alternatively, to remove the parts from the environment for study in the laboratory may result in a distorted understanding of the ecological system as a whole.[35]
2. The whole is greater than the sum of the parts. Unlike the concept of identity in which the whole equals the sum of the parts, ecological systems experience synergy: the combined action of separate parts may produce an effect greater than the sum of the individual effects. This can be exemplified by the dumping of organic sewage and industrial pollutants into lakes and rivers. The bacterial increases may cause those drinking or swimming in the water to become ill. But if the bottom of the lake is covered with metallic mercury, the overall hazard is more than doubled because the bacteria may also transform the metallic mercury into toxic methyl mercury which becomes concentrated in the food chain.[36]
3. Knowledge is context-dependent. As opposed to the context independence assumption of mechanism, in holism each part at any instant takes its meaning from the whole. For example, in a hologram, produced by directing laser light through a half-silvered mirror, each part of the three-dimensional image contains information about the whole object. There are many-to-one and one-to-many relationships, rather than the point to point correspondences between object

and image found in classical optics. Similarly, in perception, objects are integrated patterns. The whole is perceived first with an awareness of hidden aspects, background, and recognition of patterns, as when one views a tree or a house.[37]

4. The primacy of process over parts. As opposed to the closed, isolated equilibrium and near-equilibrium systems studied in classical physics (such as the steam engine), biological and social systems are open. These are steady-state systems in which matter and energy are constantly being exchanged with the surroundings. Living things are dissipative structures, resulting from a continual flow of energy, just as a vortex in a stream is a structure arising from the continually changing water molecules swirling through it. Ilya Prigogene describes an open, far-from-equilibrium thermodynamics in which new order and organization can arise spontaneously. Nonlinear relationships occur in which small inputs can spontaneously produce large effects (see chapter 4).[38]

   Continual change and process are not only significant in ecology, but also are fundamental to the new physics. Physicist David Bohm in his book *Wholeness and the Implicate Order* (1980) describes process as originating from an undivided multidimensional wholeness called a holomovement (see chapter 4). Within the holomovement is an implicate order that unfolds to become the explicate order of stable, recurring elements observed in the everyday world. The holomovement is life-implicit, the ground of both inanimate matter and of life.[39]
5. The unity of humans and nonhuman nature. As opposed to nature/culture dualism, in holism humans and nature are part of the same organic cosmological system. While theoretical ecologists often focus their research on natural areas removed from human impact, human (or political) ecologists study the mutual interactions between society and nonhuman nature.

Just as mechanism dovetailed with certain political assumptions, so holism has been seen to imply particular kinds of politics. Holism found favor among philosophers and ecologists during the 1920s. In the 1930s, however, its emphasis on the whole over and above the parts was viewed as being consistent with fascism. This contributed to the replacement of holistic and organismic assumptions in biology by mechanistic modes of descrip-

tion. In the 1960s and 1970s holistic ideas returned, with the blossoming of small-scale back-to-the-land communes and households in which decision-making was vested in the consensus of the whole group. Recently the emergence of green politics has given rise to a political movement dedicated to the establishment of an ecologically viable society (see chapter 7). Drawing on holistic assumptions, the bioregional movement emphasizes living within the resources of the local watershed and developing them to sustain the human and non-human community as an ecological whole (see chapter 9). Ecocentric ethics also have religious and spiritual components. Deep ecology, nature religions, ecological spirituality, and process philosophy have at their roots an ecocentric value system (see chapters 4 and 5).[40]

Ecocentric ethics, like egocentric and homocentric ethics, have a number of philosophical difficulties. Finding a philosophically adequate justification for the intrinsic value of non-human beings has been called by some environmental philosophers the central axiological problem of environmental ethics. In mainstream Western culture, only human beings have traditionally had inherent worth, while the rest of nature has been assigned instrumental value as a resource for humans. Thus, within an egocentric or homocentric ethic, it is not *morally* wrong to kill or use the last of a species of animal, plant, or mineral when human survival is at stake. Within an ecological ethic, however, such a decision could depend on finding an adequate justification for the intrinsic value of the non-human species, as well as on the particular circumstances. At bottom, ecocentric ethics may have a homocentric justification.[41]

A second problem stems from the distinction between facts and values. The separation of observable facts from humanly assigned values, or *is* from *ought*, has been a mainstay of Western science since the work of David Hume in the eighteenth century. Can a property such as the goodness or richness of animals, rocks, or the biosphere be inferred through the senses as an objective, intrinsic characteristic of the entities in question? Can there properly be such a thing as an ecological ethic, when ecology is an objective science and ethics is a subjective value system?

Environmental philosophers have proposed a number of answers to these questions. One approach is to question the possibility that facts can be separated from values in science and philosophy. Another is to recognize that descriptions of what *is* can include intrinsic value, while questions of what one ought to do belong to a different category.

Proponents of intrinsic value in nature include Holmes Rolston, III and J. Baird Callicott. Rolston argues that intrinsic values are objective and actually found in nature. Yet the connection between nature and values is complex. Scientific descriptions of nature and values arise together:

> Ecological description finds unity, harmony, interdependence, stability, etc. and these are valuationally endorsed.…In post-Darwinian nature. . . we looked for these values in vain, while with ecological description we now find them…here an "ought" is not so much *derived* from an "is" as discovered with it. As we progress from descriptions of fauna and flora, of cycles and pyramids, of stability and dynamism, on to intricacy, planetary opulence and interdependence, to unity and harmony…arriving at last at beauty and goodness, it is difficult to say where the natural facts leave off and where the natural values appear…The sharp is/ought dichotomy is gone; the values seem to be there as soon as the facts are fully in, and both alike are properties of the system.[42]

For Rolston, science is objective truth whose sphere continually expands with greater human knowledge. Darwinian evolution is not different from, but encompassed by, an emerging science of ecology. Yet values are inherent in science itself and not separate from it. They are discovered in nature simultaneously with objective truths about it. Rolston's approach is an inversion of a social constructivist viewpoint. The social construction of science would argue that both truths and values are deeply intertwined, but they are imposed on nature by humans imbedded in a value system derived from their place in class society and in social history.

Callicott's primary concern is to derive a philosophical basis for assigning intrinsic rather than merely instrumental value to nonhuman nature. If nonhuman species can be shown to have intrinsic value, then it follows as a powerful corollary that other species have a right to exist in and of themselves, and that humans have moral obligations to them. In searching for a basis for intrinsic value in nature, Callicott offers the argument that quantum mechanics could provide such a foundation. If quantum theory forces us to abandon the sharp dichotomy between subject and object characteristic of the Cartesian/Newtonian mechanistic worldview, then David Hume's sharp distinction between valuing subjects and value-free objects, or between is and ought must also be abandoned. Thus from revolutionary changes in science follow revolutionary changes in ethics. Such considerations also lead to a breakdown of the dualism between self and world. "Since nature is the

self fully extended and diffused, and the self, complementarily, is nature concentrated and focused in one of the intersections, the 'knots,' of the web of life,…nature is intrinsically valuable, to the extent that the self is intrinsically valuable."[43]

Like Rolston, Callicott accepts the evolution of science as providing ever greater access to truth. We simply expand our understanding of the fact that nature now includes both subject and object intertwined and interacting. We evolve from a mechanistic framework for grounding ethics to a quantum mechanical framework. But neither philosopher takes into consideration the social or political basis on which much of science is constructed and in which its theories are imbedded.

Yet another difficulty with Aldo Leopold's and Roderick Nash's formulation of ecocentric ethics lies in their supposition of the development of sequential ethics. The advancement of civilization does not necessarily imply the evolution of more sophisticated ethics. The assumption that the earliest ethics dealt with the relations between individuals imposes the assumptions of Hobbes' hypothetical "state of nature" and the individualism of *laissez faire* capitalism onto the earliest peoples.[44]

Finally, some feminists and persons of color criticize ecocentrism for a holism that masks a gender, racial, and species difference. Ecocentric ethics make each individual—whether mosquito or person, male or female, white or black—equally subordinate to the overarching whole.[45]

MULTICULTURAL ENVIRONMENTAL ETHICS

In recent years a number of philosophers have moved beyond ecocentric ethics to ethical formulations that include principles of environmental justice and cultural diversity and respond to globalization. Callicott proposes a multicultural ethic that builds on the complementarity between biological diversity and cultural diversity. Not only is the human species one species, it is also many cultures. All humans are part of a local, bioregional culture and an international global culture. Grounding an ethic in postclassical science transcends the conflicts that may occur between local and global geopolitics. A reciprocity exists between local knowledge systems that grow out of local ecological conditions and postclassical science which is far more open and flexible than Newtonian mechanistic science. The practice of swidden horticulture by the

Kayapó Indians of South America resonates with ecological principles of fallow, forest regeneration, and natural plant succession. Many indigenous traditions grounded in metaphors such as the Jeweled Net of Indra or the Yin-Yang mandala are consonant with new scientific narratives such as the "order out of chaos" approach to thermodynamics of Ilya Prigogine and Isabelle Stengers and David Bohm's idea of an implicate order (see chapter 4). Callicott writes, "I am inspired to seek a middle path by the observation that while we are many people—Chinese people, Kayapó people, Indonesian people—we are also just people, equally and indifferently members of one species. And while we inhabit many cultural worlds—the Confuscian world, the Hindu world, the Christian world—we also inhabit one ecologically seamless biosphere, one planet, washed by one ocean, enveloped in one atmosphere. We are many and also one." Callicott's multicultural ethics is rooted in partnership. "Thus the one globally intelligible and acceptable ecological ethic and the many culture-specific ecological ethics may mutually reflect, validate, and correct one another—so they may exist in a reciprocal, fair, equal, and mutually sustaining partnership."[46]

Feminist philosophers have also proposed ways to synthesize ecological ethics with multiculturalism and environmental justice. Karen Warren uses the metaphor of a fruit bowl to create a care-sensitive ethic that is both inclusive and nonhierarchical. No adequate environmental ethic will "promote sexism, racism, classism, naturism, or any other 'ism of social domination.' " Warren bases her environmental ethic on people's capacity to care for others (people who are both like us and different from us) and the environment (redwoods, rocks, and dolphins); the idea of situated universals (e.g. justice, rights, and duties) in particular situations, and care practices (behaviors of care in specific situations). In the fruit bowl are different ethical principles from Western philosophy, such as self-interest, utility, virtue, duties, and rights. They apply in particular situations that include both the ability to care and care practices. Ethics is not a system of abstract, universal principles implemented by detached rational actors, but about "what imperfect human beings living in particular historical, socioeconomic contexts can and should do, given those contexts." Practices that oppress or torture others, harm indigenous peoples, or destroy natural ecosystems are not care practices and are not a part of a care-sensitive ethic. Care practices are gender, race, and

environmentally sensitive. They take into account local and historical realities and attempt to resolve conflicts before they arise. As an applied environmental ethic, "traditional principles of rights, duty, justice, utility, and self-interest may provide important philosophical avenues to secure protection of [for example] dolphins. But they do not, by themselves, give expression to what is morally fundamental to human interaction with selves and others." To get at such relationships, Warren argues, "one must talk about and cultivate the ability to care about earth others, and to care abut them as earth others—as dolphins, not simply as sources of enjoyment or other benefit for humans."[47]

A third form of multicultural environmental ethics is that of Chris Cuomo. Cuomo's "ethic of flourishing" is grounded in the good, and reflects a "commitment to the flourishing, or well-being, of individuals, species, and communities." An ethic of flourishing values all individuals and rejects hierarchies that devalue women, people of color, and nature. The flourishing of human communities is intrinsically tied to the well-being of nature. The greatest good includes the "interests of all living beings and systems." It aims toward the "flourishing of moral agents and the entities that they value deeply for noninstrumental reasons; and the entities upon which they rely for life itself; and entities that are irreplaceable, can feel pain, and are friend and kin to humans." The goal of Cuomo's ethic is to promote actions that will transform destructive ideologies, institutions, and practices that degrade people of all races, both sexes, and the environment.[48]

These forms of multicultural environmental ethics explicitly address issues of race and racism connecting them with problems of globalization, sexism, and naturism. They seek ways of relating environmental ethics to social justice in order to promote the well-being of both humans and nonhuman nature.

PARTNERSHIP ETHICS

My own synthesis between ecocentrism and environmental justice is partnership ethics. *A partnership ethic holds that the greatest good for the human and nonhuman communities is in their mutual living interdependence.*[49] A partnership ethic is grounded, not in the self, society, or the cosmos, but in the idea of relation. It has five precepts:

- Equity between the human and nonhuman communities
- Moral consideration for both humans and other species
- Respect for both cultural diversity and biodiversity
- Inclusion of women, minorities, and nonhuman nature in the code of ethical accountability
- An ecologically sound management that is consistent with the continued health of both the human and the nonhuman communities

A partnership ethic entails a viable relationship between a human community and a nonhuman community in a particular place, a place in which connections to the larger world are recognized through economic and ecological exchanges. It is an ethic in which humans act to fulfill both humanity's vital needs and nature's needs by restraining human hubris. It is a synthesis between an ecological approach (or ecocentric ethics) based on moral consideration for all living and nonliving things and a human-centered (or homocentric ethics) approach based on the social good and the fulfillment of basic human needs. All humans have needs for food, clothing, shelter, and energy, but nature also has an equal need to survive. The new ethic questions the notion of the unregulated market, sharply criticizing egocentric ethics—what is good for the individual is good for society—and instead proposes a partnership between nonhuman nature and the human community.

A partnership ethic brings humans and nonhuman nature into a dynamically-balanced, more nearly equal relationship with each other. Humans, as the bearers of ethics, acknowledge nonhuman nature as an autonomous actor which cannot be predicted or controlled except in very limited domains. We acknowledge that we have the potential to destroy life as we currently know it through nuclear power, pesticides, toxic chemicals, and unrestrained economic development and act to exercise specific restraints on that ability. We cease to create profit for the few at the expense of the many. We instead organize our economic and political forces to fulfill people's vital needs for food, clothing, shelter, and energy, and to provide security for health, jobs, education, children, and old age. Such forms of security would rapidly reduce population growth rates since a major means of providing security would not depend on having large numbers of children or on economies in which boys are favored over girls as is the case in many countries today.

If we know that a major earthquake in Los Angeles is likely in the next seventy-five years, a utilitarian, homocentric ethic would state that the

government ought not to license the construction of a nuclear reactor on the fault line. But a partnership ethic says that, we, the human community, ought to respect nature's autonomy as an actor by limiting building and leaving open space. If we know there is a possibility of a one hundred-year flood on the Mississippi River, we respect human needs for navigation and power, but we also respect nature's autonomy by limiting our capacity to dam every tributary that feeds the river and build homes on every flood plain. We leave some rivers wild and free and leave some flood plains as wetlands, while using others to fulfill human needs. If we know that forest fires are likely in the Rockies, we do not build cities along forest edges. We limit the extent of development, leave open spaces, plant fire resistant vegetation, and use tile rather than shake roofs. If cutting tropical and temperate old-growth forests creates problems for both the global environment and local communities, but we cannot adequately predict the outcome or effects of those changes, we need to conduct partnership negotiations in which nonhuman nature and the people involved are equally represented.

A partnership ethic is grounded in the concept of relation rather than in the ego, society, or the cosmos. In *Feminism and the Mastery of Nature*, philosopher Val Plumwood argues that relation is based on continuity and difference, rather than mastery and colonization. "The relational self delineates the general structure of a relationship of respect, friendship, or care for the other." Such ideals would allow the earth community to flourish and would avoid the intense separation of self from world characteristic of the mechanistic, instrumental approach that masters nature as slave.[50] Riane Eisler uses the term partner to embrace female/male and as well as same-sex relationships to formulate new ways of engaging in politics and discourse. The partnership model is based on male-female linking (rather than male dominance) and offers hope for an egalitarian political and economic society. In *Sacred Pleasure*, she proposes a new "politics of partnership" based on nurturing and caring forms of socialization for both sexes and a grassroots politics of social equity.[51] Philosopher Alison Jaggar examines new forms of discourse that draw on both feminist ethics and multicultural democracies. She notes, "We should pursue critical engagement with those members of nonwestern communities who share some of our own commitments, but who may have disagreements or different perspectives on particular issues."[52] These approaches can be extended to include discourse with those who may speak for and ask

us to listen to the voice of nature as a partner at the table, thereby including the nonhuman world in the partnership ethic.

Like the preceding ethics, the multicultural and partnership ethics have religious dimensions grounded in humanity's spiritual relations with nature. Theologian Rosemary Radford Ruether argues that men and women in both First and Third World cultures need to see themselves as integrated within the cycles of life and death and to find ways of living in sustainable relationships with nature. Many Third World philosophies are imbedded within a web of spiritual relations with nature. Brazilian theologian Ivone Gebara views the universe as a trinity comprising cosmos, earth, and all peoples. All are interrelated—transforming and adapting to each other as creative forces in which the diversity of earth's peoples are immersed. Each person is, in turn, a cosmic, terrestrial, and cultural citizen integrated with all others in one community of being. Similarly, the worldview of the Shona of Zimbabwe is rooted in the relationality of all existence and management practice follows particular rules for cutting trees and gathering wood. For the Kalinga of the Philippines interdependence means a give and take between people and nature: "we take care of the land and the earth also takes care of us."[53]

Theologian Sallie McFague in *The Body of God* (1993) proposes a dialectical ecological theology based on an organic model of nature. God is both transcendent above and immanent within the world. "God [is] the One who is in, with, and under the entire process of the universe." We and all of the earth are God's living body. This model of God as both creative agent and active life within the world is neither theist not pantheist but panentheist. It "does not reduce God to the world nor relegate God to another world; on the contrary, it radicalizes both divine immanence (God is the breath of each and every creature) and divine transcendence (God is the energy empowering the entire universe)."[54] These theological approaches are all grounded in humanity's spiritual relations with nature and exhibit concern for the diversity of human cultures and reverence for all of life. As such they are consistent with the goals of multicultural and partnership ethics.

Partnership and multicultural ethics make visible the connections between people and the environment in an effort to find new cultural and economic forms that fulfill vital needs, provide security, and enhance the quality of life without degrading the local or global environment. They create both a structure and a set of goals that can enable decision-making, consensus,

and mediation to be achieved without contentious litigation. They relate work in the sciences of ecology, chaos, and complexity theory to possibilities for new spiritual and non-dominating relationships between diverse groups of humans and nonhuman nature (see chapters 4 and 5).

CONCLUSION

Egocentric, homocentric, and ecocentric environmental ethics have all received attention and development since the environmental movement of the 1970s and 1980s. Forms of multicultural environmental ethics go beyond these approaches to seek moral grounds for promoting both environmental well-being and social justice. Partnership ethics is a relatively new approach, one that has potential for resolving some these difficult environmental and cultural problems. In conflicts of interest over environmental and quality of life issues, the above categories are useful in analyzing the implicit ethical positions assumed by both mainstream and radical political groups and may offer grounds for problem resolution. Variations of these forms of environmental ethics also underlie the political positions of the environmental theorists of Part II and the environmental activists of Part III. Environmental ethics thus link the ideas of theorists with the movements of activists, translating ideas into behaviors in the effort to bring about a livable world.

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II

THOUGHT

4

DEEP ECOLOGY

Deep ecologists call for a new ecological paradigm that will replace the dominant mechanistic paradigm of the past three hundred years. This new worldview would represent as profound a transformation as the one which occurred during the scientific revolution of the seventeenth century. It would be so fundamental that it would entail new metaphysical, epistemological, religious, psychological, sociopolitical, and ethical principles. Taking its name and approach from Norwegian philosopher Arne Naess' conference paper presented in Bucharest in 1972 and published in 1973 as "The Shallow and the Deep, Long-Range Ecology Movement," deep ecology holds that the reform environmentalism of the 1970s and 1980s dealt only with legal and institutional fixes for pollution and resource depletion, rather than fundamental changes in human relations with nonhuman nature (see Table 4.1). When in 1986 sociologist Bill Devall and philosopher George Sessions published a book, and writer Michael Tobias published a collection of articles on the topic, deep ecology gained visibility beyond the community of philosophers. It has now become the legitimating framework for an array of ecological movements from spiritual Greens to radical Earth First!ers.[1]

A dominant social paradigm, according to Devall who elaborated on Naess's approach, is a "mental image of social reality that guides expectations in a society."[2] Deep ecology challenges the dominant western paradigm elaborated in

Table 4.1

Arne Naess' Principles of Deep Ecology

1. Rejection of the man-in-environment image in favor of the relational, total-field image.
2. Biospherical egalitarianism.
3. Principles of diversity and of symbiosis.
4. Anti-class posture.
5. Fight against pollution and resource depletion.
6. Complexity, not complication.
7. Local autonomy and decentralization.

Source: Arne Naess, "The Shallow and the Deep, Long-Range Ecology Movement. A Summary," *Inquiry*, 16 (1973): 95–100.

chapter 2. It calls for a new ontology (science of being), a new epistemology (way of knowing), a new psychology (idea of self), and a new metaphysics (assumptions about the world). It offers a new science of nature, a new spiritual paradigm, and a new ecological ethic. Deep ecological thinking emerges from the sense of ecological crisis detailed in chapter 1. It is thus socially produced and socially constructed. It focuses, however, on transformation at the level of consciousness and worldview in relation to ecology, rather than the transformation of production and reproduction. It supports and legitimates new social and economic directions that move the world toward sustainability.

PRINCIPLES OF DEEP ECOLOGY

The first principle of deep ecology, states Devall, is a new metaphysics that places humans in nature not above it. This cosmic/ecological metaphysics stresses an I/thou relationship between humans and non-human nature and the integrity of person/planet. The principle of biospheric equality places humans on an equal level with all other living things in an organismic democracy. Here it draws from the science of ecology which attributes equal importance to every component of the interlinked web of nature.[3]

Second, a new psychology, or philosophy of self, is required. This means a total intermingling of person with planet. A society based on the prominence of individual egos gives way to a new spiritual freedom to develop an interconnected community. Urban intellects previously dedicated

to the self-consciousness of power over planet open themselves to a person in planet consciousness. This avenue draws them down a Buddhist or Hinduist pathless path by which self can be integrated into the Great Self. Modesty and humility and an awe of evolution take precedence over an assertion of human power over the biosphere. Spiritual ecology and the spiritual wing of the Greens movement in the United States further develop this assumption (see chapter 5).

Third, deep ecology develops a new anthropology that draws its guidelines from studies of horticulturalists and gatherer-hunters. Reinhabiting the land as "dwellers in it" rejects industrial society as the world paradigm for development and entails leaving vast tracts of land as wilderness. People can live their lives as "future primitive" withdrawing from developed land and allowing it to reestablish itself as wilderness. For each ecological region, the guideline for use should be human carrying capacity. Much of the thought underlying the bioregional movement stems from this assumption (see chapter 9).

Fourth, deep ecology espouses an ecocentric rather than a homocentric (or anthropocentric) ethic. In using nonhuman nature, people have a duty to maintain the integrity of the ecosphere, not to conquer it or make it more efficient. Although living entails some killing, other organisms have a right to exist and evolve just as do humans. Humans are dependent on the ecosphere for survival and should not exploit it as a master does a slave. This assumption is fundamental to an emerging ecological ethic rooted in ecologist Aldo Leopold's 1949 "land ethic."

Fifth, a new ecologically-based science promotes a sense of human place within the household of nature. A non-violent peace with nature is declared. The new scientist takes her cue from the ancient shaman rather than the genetic engineer. The new science is process oriented. It draws on design with nature, rather than the imposition of form on nature. Biological and cultural diversity are desired ends. These can be reached and maintained through soft energy and appropriate technology paths. Technology is not an end but a means to human welfare.

Deep ecology's sources include alternative traditions in western thought as well as the beliefs of native peoples and eastern philosophers. In the Western religious tradition it espouses the teachings of Saint Francis of Assisi, rather than the Judeo-Christian tradition of domination over nature. From Eastern philosophy it learns from interpreters and poets such as Alan Watts, Daisetz

Suzuki, and Gary Snyder and draws on historian Joseph Needham's work on science and civilization in China. From Native American leaders such as Black Elk and Luther Standing Bear, it seeks a new religious ecology and social organization. Alternative western philosophers provide guidelines to the possibility of integrating humans within nature. These include the pre-Socratics, Giordano Bruno, Baruch Spinoza, Gottfried Wilhelm Leibniz, Henry David Thoreau, John Muir, George Santayana, Alfred North Whitehead, Aldo Leopold, Robinson Jeffers, and Martin Heidegger. Deep ecology draws its scientific inspiration from Paul Shepard's view that ecology is a subversive science—the basis of a social and scientific resistance movement.[4]

In 1986 Naess further elaborated on the deep ecology framework. He defined an 8-point Deep Ecology Platform (see Table 4.2) and sketched a

Table 4.2

Arne Naess' 8-Point Deep Ecology Platform

1. The well-being and flourishing of human and non-human life on Earth have value in themselves (synonyms: intrinsic value, inherent worth). These values are independent of the usefulness of the non-human world for human purposes.
2. Richness and diversity of life forms contribute to the realization of these values and are also values in themselves.
3. Humans have no right to reduce this richness and diversity except to satisfy vital needs.
4. The flourishing of human life and cultures is compatible with a substantially smaller human population. The flourishing of non-human life *requires* a smaller human population.
5. Present human interference with the non-human world is excessive, and the situation is rapidly worsening.
6. Policies must therefore be changed. These policies affect basic economic, technological, and ideological structures. The resulting state of affairs will be deeply different from the present.
7. The ideological change will be mainly that of appreciating life quality (dwelling in situations of inherent value) rather than adhering to an increasingly higher standard of living. There will be a profound awareness of the difference between bigness and greatness.
8. Those who subscribe to the foregoing points have an obligation directly or indirectly to try to implement the necessary changes.

Source: Arne Naess, "The Deep Ecological Movement: Some Philosophical Aspects," *Philosophical Inquiry*, 8, nos. 1–2 (1986).

4-level diagram of the framework, known as the "apron diagram." Level 1, on the top of the diagram, consists of ultimate philosophical principles (such as those of Christianity, Buddhism, or those of philosophers such as Baruch Spinoza or Alfred North Whitehead.) Level 2 is the 8-point Deep Ecology Platform. On level 3 are the general consequences of the principles, while on level 4 are the concrete decisions that pertain to particular situations and to individual life-styles.[5]

Naess calls his own deep ecological philosophy, "Ecosophy T" (named after his mountain cabin, Tvergastein), and encourages others to create and name their own deep ecologies. Naess's philosophy has only one ultimate principle—Self-realization. The larger Self comprehends all of life of which each individual self is only one part. The norm that follows from this ultimate principle is "Maximize Self-realization," or stated another way, "Live and let live," referring to all life and life forms on the planet. As one's own self realization increases, one increasingly identifies with other beings and one's own self expands outward into the great Self. This process of increasing Self-realization was described by poet Robinson Jeffers as "falling in love outward."

Another call for a "New Ecological Paradigm" (NEP) comes from sociologists William Catton and Riley Dunlap. Following Columbus' discovery of the New World, they argue, Europeans expanded "exuberantly" across America, to use the language of Great Plains historian Walter Prescott Webb, where the person/land ratio was ten times less than in Europe. An age of abundance and industrialization followed in which nature was exploited by a "people of plenty," who clung to an ideology of progress. The "Dominant Western Worldview" (DWW), which guided American development, assumed that people were different from all other organisms and were in charge of their own destiny. Because global resources were so abundant, and people had a unique capacity to develop and solve problems using technology, they believed they would always be able to find solutions that would continue humanity's forward progress. A corollary to this worldview, the Human Exemptionalism Paradigm (HEP), assumed that human societies were exempt from the consequences of ecological principles and environmental constraints (see Table 4.3)

The ecological crisis and the growing awareness of resource scarcity, however, challenge these older assumptions. Catton and Dunlap suggest that a New Ecological Paradigm will replace the Dominant Western Worldview

Table 4.3

Environmental Paradigms

		Dominant Western Worldview (DWW)		Human Exemptionalism Paradigm (HEP)		New Ecological Paradigm (NEP)
Assumptions about the nature of human beings	DWW_1	People are fundamentally different from all other creatures on Earth, over which they have dominion.	HEP_1	Humans have a cultural heritage in addition to (and distinct from) their genetic inheritance, and thus are quite unlike all other animal species.	NEP_1	While humans have exceptional characteristics (culture, technology, etc.), they remain one among many species that are interdependently involved in the global ecosystem.
Assumptions about social causation	DWW_2	People are master of their destiny; they can choose their goals and learn to do whatever is necessary to achieve them.	HEP_2	Social and cultural factors (including technology) are the major determinants of human affairs.	NEP_2	Human affairs are influenced not only by social and cultural factors, but also by intricate linkages of cause, effect, and feedback in the web of nature; thus purposive human actions have many unintended consequences.
Assumptions about the context of human society	DWW_3	The World is vast, and thus provides unlimited opportunities for humans.	HEP_3	Social and cultural environments are the crucial context for human affairs, and the biophysical environment is largely irrelevant.	NEP_3	Humans live in and are dependent upon a finite biophysical environment which imposes potent physical restraints on human affairs.
Assumptions about constraints on human society	DWW_4	The history of humanity is one of progress; for every problem there is a solution, and thus progress need never cease.	HEP_4	Culture is cumulative; thus technological and social progress can continue indefinitely, making all social problems ultimately soluble.	NEP_4	Although the inventiveness of humans and the powers derived therefrom may seem for a while to extend carrying capacity limits, ecological laws cannot be repealed.

Source: William R. Catton, Jr. and Riley Dunlap. "A New Ecological Paradigm for Post-Exuberant Sociology," *American Behavioral Scientist*, 24, no. 1 (Sept/Oct. 1980): 34, reprinted by permission.

and the concept of human exemptionalism, ushering in a "post-exuberant age" (Figure 4.1). The ecological paradigm rests on an historically new set of assumptions about people and nature. The NEP assumes that although humans have unique characteristics as a species, they are still subject to the same ecological laws and restraints as other organisms. Humans are dependent on finite natural resources and there are important linkages and feedbacks between human societies and the ecosystems in which they are imbedded. If human technological progress exceeds the carrying capacity of the land, the laws of ecology will force adjustments. A steady state or sustainable society is "one that provides for successful human adaptation to a finite (and vulnerable) ecosystem on a long-term basis."[6]

A third push to establish a deep ecological paradigm comes from physicist Fritjof Capra. Famous both for his analysis of the similarity between the assumptions underlying the new physics and eastern philosophy (in *The Tao of Physics*) and his call for a revolution in thought patterns (in *The Turning Point* and in *Hidden Connections)*, he has embraced deep ecology as the most succinct term for the emerging worldview. The worldview that has dominated Western society for the past three hundred years, he argues, assumes that the universe is made up of elementary particles, the human body is a machine, society is based on a Darwinian competitive struggle for existence, a belief in material progress, and that the female is subordinate to the male.[7]

Deep ecology, Capra believes, offers a holistic worldview that emphasizes the whole over the parts and does not separate humans from the environment. The ecological paradigm entails a new ethic that recognizes the intrinsic value of all beings, one that will replace the anthropocentric ethics of the past. "All natural systems are wholes whose specific structures arise from the interactions and interdependence of their parts. Systemic properties are destroyed when a system is dissected, either physically or theoretically, into isolated elements. Although we can discern individual parts in any system, the nature of the whole is always different from the mere sum of its parts." Similarly, a new green economics sees the economy as a living system made up of interacting human beings and social organizations. Its goals are to maximize human health, welfare, basic needs, and the environment, rather than profit. A number of new social movements have embraced these goals, including the ecology, feminist, holistic health, human potential, and green movements.

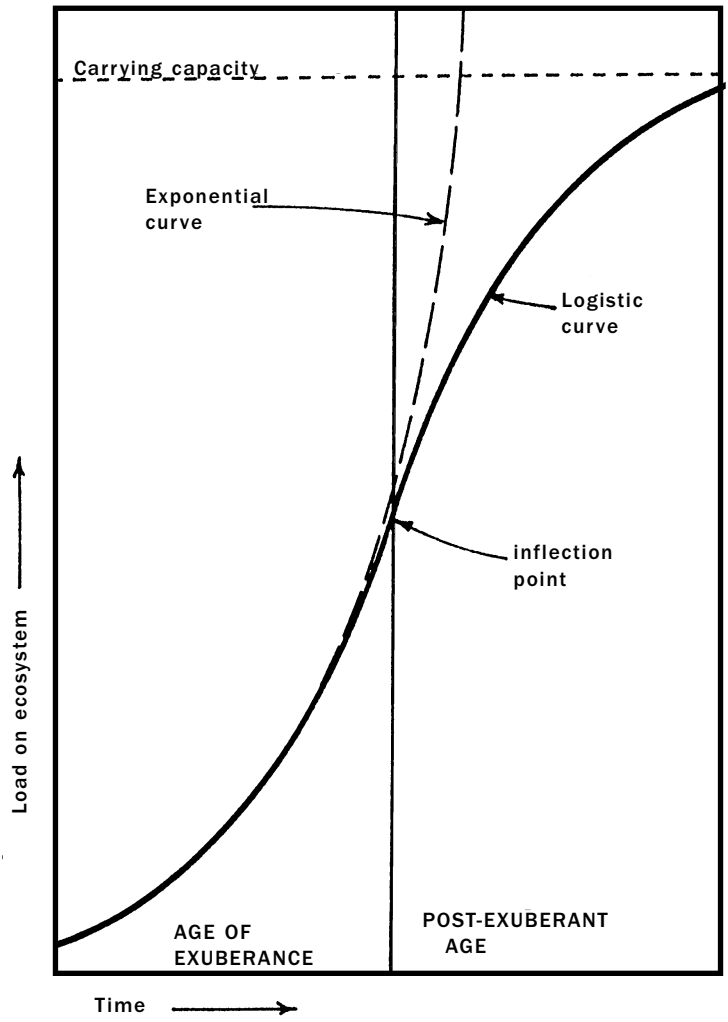

Figure 4.1 Exponential and Logistic Growth Models

Source: William R. Catton, Jr. and Riley E. Dunlap, "A New Ecological Paradigm for Post-Exuberant Sociology," *American Behavioral Scientist*, 20, no. 1 (September/October 1980): 28, reprinted by permission.

The transition to a new worldview, Capra believes, coincides with a transformation in values that could bring about a balance between the rational and the intuitive, the reductionist and holistic, and the analytic and synthetic. The purpose is not to abandon one mode for the other, but to work toward a balance between them.[8]

SCIENTIFIC ROOTS OF DEEP ECOLOGY

Emerging over the past decade are a number of scientific proposals that challenge the scientific revolution's mechanistic view of nature. The new sciences reinforce deep ecology's call for context dependence, process, and an ecocentric ethic of person-in-nature rather than apart from it.

According to physicist David Bohm, a mechanistic science based on the assumption that matter is divisible into parts (such as atoms, electrons, or quarks) moved by external forces may be giving way to a new science based on the primacy of process. In the early twentieth century, he argues, relativity and quantum theory began to challenge mechanism. Relativity theory postulated that fields with varying strengths spread out in space. Strong, stable areas, much like whirlpools in a flowing stream, represented particles. They interacted with and modified each other, but were still considered external to and separate from each other. Quantum mechanics mounted a greater challenge. Motion was not continuous, as in mechanistic science, but occurred in leaps. Particles, such as electrons, behaved like waves, while waves, such as light waves, behaved like particles, depending on the experimental context. Context dependence, which was antithetical to mechanism and part of the organic worldview, was a fundamental characteristic of matter.

Bohm's process physics challenges mechanism still further. He argues that instead of starting with parts as primary and building up wholes as secondary phenomena, a physics is needed that starts with undivided, multidimensional wholeness (a flow of energy called the holomovement) and derives the three dimensional world of classical mechanics as a secondary phenomenon. The explicate order of the Newtonian world in which we live unfolds from the implicate order contained in the underlying flow of energy.

Bohm suggests that the holomovement contains the principle or seed of life that directs the environment as well as the energy that comes from the soil, water, air, and sunlight. Just as a forest contains trees that are continually being replaced by new ones, so a particle is in a stable, but continual state of regular changes that manifest over and over again. Living and inanimate things are similar in that they reproduce themselves over and over by unfoldment and enfoldment. When inanimate matter is informed by a seed containing information in its DNA, it produces a living plant which in turn reproduces a seed. The plant exchanges matter and energy with its environment; carbon dioxide

and oxygen cross the cell boundaries. At no point is there a sharp distinction between life and non-life. "The holomovement which is 'life-implicit,' says Bohm, "is the ground both of 'life-explicit' and of 'inanimate matter'....Thus we do not fragment life and inanimate matter, nor do we try to reduce the former completely to nothing but an outcome of the latter."[9]

Another challenge to mechanism comes from the new thermodynamics of Ilya Prigogine. The clock-like machine model of nature and society that dominated the past three centuries of western thought may be winding down. While Newtonian classical physics is still valid, it is nonetheless limited to a clearly defined domain of the total world. It was extended in the nineteenth century to include theories of thermodynamics that developed out of the needs of a steam-engine society, electricity and magnetism that supplied the light and electricity that powered that society, and hydrodynamics or the science associated with the dams and water power that generated its electricity. The equilibrium and near-equilibrium thermodynamics of nineteenth-century classical physics had beautifully described closed, isolated systems such as steam engines and refrigerators.

In dealing with the emergence of order out of chaos, Prigogine's theory helped to clarify an apparent contradiction between two nineteenth century scientific developments. Classical thermodynamics, which says that the universe is moving toward a greater state of chaos, is based on two laws. The first law states that the total energy of the universe is constant and only changes its form as it is transferred from mechanical, to chemical, to hydrodynamic, to metabolic, and so on. But the second law states that the energy available for work—the useful energy—is decreasing. The universe is running down, just as a clock unwinds over time when no one is there to rewind it. The second law implies that the world proceeds from order to disorder, that people grow older, and that in billions of years the whole universe will reach a uniform temperature. The classical model of reality deals very adequately with closed systems that are isolated from their environments—situations in which small inputs result in small outputs that can be described by linear mathematical relationships.

Yet the very concept of an unwinding clocklike universe is apparently contradicted by another startling nineteenth-century theory—evolution, or the motion toward greater order. Darwinian evolution says that biological systems are evolving, not running down. They are moving from disorder

to order; they are becoming more organized rather than disorganized. The direction of change over time is from simple to more complex life forms. The apparent contradiction lies in the domain in which the laws apply. Mechanical systems are closed systems isolated from the environment and their laws pertain to only a small part of the universe. In contrast, most biological and social systems are open, not closed. They exchange matter and energy with the environment.

Prigogine argued that classical thermodynamics holds in systems that are in equilibrium or near-equilibrium, such as pendulum clocks, steam engines, and solar systems. These are stable systems in which small changes within the system lead to adjustments and adaptations. They are described mathematically by the great seventeenth- and eighteenth-century mathematical advances in calculus and linear differential equations. But what happens when the input is so large that a system cannot adjust? In these far-from-equilibrium systems, nonlinear relationships take over. In such cases small inputs can produce new and unexpected effects.

Prigogine's far-from-equilibrium thermodynamics allows for the possibility that higher levels of organization can spontaneously emerge out of disorder when a system breaks down. His approach applies to social and ecological systems, which are open rather than closed, and helps to account for biological and social evolution. In the biological realm, when old structures break down, small inputs can (but do not necessarily) lead to positive feedbacks that may produce new enzymes or new cellular structures. In social terms, revolutionary changes can take place. On a large scale, a social or economic revolution can occur in which a society regroups around a different social or economic form, such as the change from gathering-hunting to horticulture, or from a feudal society to a preindustrial capitalist society. In the field of science, a revolutionary change could entail a paradigm shift toward new explanatory theories, such as the change from a geocentric Ptolemaic cosmos to a heliocentric Copernican universe.[10]

The recent emergence of chaos theory in mathematics suggests that deterministic, linear, predictive equations, which we learn in freshman calculus and which form the basis of mechanism, may apply to unusual rather than usual situations. Instead, chaos, in which a small effect may lead to a large effect, may be the norm. Thus a butterfly flapping its wings in Iowa can result in a hurricane in Florida. Chaos theory reveals patterns of complexity that lead to

a greater understanding of global behaviors, but militate against over-reliance on the simple predictions of linear differential equations.

The butterfly metaphor originated with Edward Lorenz, Professor of Meteorology at the Massachusetts Institute of Technology, who used it to describe the phenomenon of sensitive dependence on initial conditions. In a talk entitled, "Predictability: Does the Flap of a Butterfly's Wings in Brazil Set Off a Tornado in Texas?" he wrote: "The question which really interests us is whether. . . for example, two particular weather situations differing by as little as the immediate influence of a single butterfly will generally after sufficient time evolve into two situations differing by as much as the presence of a tornado. In more technical language, is the behavior of the atmosphere unstable with respect to perturbations of small amplitude?"

Lorenz's work, for which he won the 1983 Crafoord Prize of the Royal Swedish Academy of Sciences, led him to question the possibility of finding suitable linear prediction formulas for weather forecasting and instead to develop models based on nonlinear equations. He argued that irregularity is a fundamental property of the atmosphere and that the rapid doubling of errors from the effects of physical features precludes great accuracy in real-world forecasting. Most environmental and biological systems, such as changing weather, population, noise, non-periodic heart fibrillations, and ecological patterns, may in fact be governed by non-linear chaotic relationships.[11]

Complexity theory is a new science that deals with the realm between chaos and order. The science of complex systems bridges the gap between order and chaos and suggests a narrative of law-like regularities, branching histories, "frozen accidents," and adaptive reorganizations—or failures to adapt. A range of entities and possibilities exists that moves from simplicity, to complexity, to complex adaptive systems—from the quark (invented by Nobel physicist Murray Gell-Mann) to the ecosystem to the nation state.

The quark, according to Gell-Mann in *The Quark and the Jaguar* (1994), exemplifies a simple entity, the jaguar a complex organism, while human societies are complex adaptive systems. "A complex adaptive system is a system that learns or evolves by utilizing acquired information.…It compresses regularities into concise packages that are often called schemata.…In biological evolution, the genome of an organism is a schema. In the scientific enterprise, a theory is a schema. In the evolution of a society, such things as laws, traditions, kinship rules, and myths constitute schemata." The environment,

societies, and the economy are all complex adaptive systems. The emergence of life, biological and cultural evolution, and computers are examples of the ways in which one complex system gives rise to another.[12]

According to Gell-Mann, we live in a quasiclassical world governed by quantum mechanical laws which, because of the limitations of our senses and instruments, can only be experienced as coarse-grained—like the graininess of a blown-up photograph. Deviations from classically determined events can nevertheless be described by probabilities. But just as Heisenberg's uncertainty principle injects indeterminacy at the micro (or atomic level), so chaotic processes, or sensitive dependence on initial conditions (as in weather phenomena—Lorenz's "butterfly effect") inject indeterminacy at the macro (or everyday world) level. Alternative, and often unpredictable, pathways of development result. These branching histories, or "gardens of forking paths" (a metaphor created by writer Jorge Luis Borges) are mutually exclusive pathways that result in the evolution of complex adaptive systems. From the beginning of the universe, through all of time, the initial expansion branches into alternatives for which there are well-defined probabilities. But these alternative branches are mutually exclusive. In one branch a planet may ultimately result from a quantum accident billions of years ago, but in another no planet can occur.[13]

Chance operates in the realm between order and chaos to create complexity. Fundamental laws combine with chance to generate "frozen accidents"—events that could have been different, but because of the way they turn out produce a multitude of specific results, as when a vice-president becomes president after an assassination. "Complex adaptive systems," says Gell-Mann, "function best in a regime intermediate between order and disorder. They exploit the regularities provided by the approximate determinism of the quasiclassical domain, and at the same time they profit from… indeterminacies (describable as noise, fluctuations, heat, uncertainty, and so on)…."[14]

Complex biological and social systems are not controlled by central mechanisms and do not change in a linear manner. Their internal dynamics, operating in response to external conditions, can result in rapid change from a small input (the introduction of a disease or a natural disaster, for example). In biology, a genome responding favorably to selection pressure will survive and reproduce. In science, a theory or schema that explains empirical data and predicts verifiable results will be selected over those that fail in some major

respect. In cultural development, societies that respond creatively to changing environmental and social conditions by successfully applying existing rules (moving to a new location when drought occurs) or developing new schemata (religious rituals or new agricultural techniques) will survive; those that fail will die out.[15]

Throughout the history of the earth, complex adaptive biological and social systems have developed which exhibit regularities in efficient organization and distribution of resources that allow them to persist over time, accumulate and exchange information, and continue to evolve. They interact with each other and with other parts of nonhuman nature, persisting in transition zones between order and disorder. Today many of these diverse biological systems and human cultures are threatened with decline or extinction. We need to try to imagine what an ecologically sustainable planet, in which both biological and cultural diversity are preserved, would look like. Gell-Mann urges: "It is worthwhile to try to construct models of the future—not as blueprints but as aids to the imagination—and see if paths can be sketched out that may lead to such a sustainable and desirable world late in the next century, a world in which humanity as a whole and the rest of nature operate as a complex adaptive system to a much greater degree than they do now."[16]

ECOLOGY AND GAIA

New approaches to ecology and biology likewise challenge mechanistic approaches to science and contribute to deep ecology's emphasis on the interconnectedness of humanity with the earth (Gaia). Unlike mechanistic science, ecology is based on open, rather than closed systems and emphasizes nature as continuous change and process. The idea of a balance of nature that humans could disrupt implied that people could repair damaged ecosystems with better practices, using what deep ecologists term reform (or shallow) ecology. The idea that biodiversity led to ecosystem stability meant that species conservation and ecological restoration could improve ecosystem health. But chaos theory as applied to ecology suggests that natural disturbances and mosaic patches that do not exhibit regular or predictable patterns are the norm rather than the aberration. Such theories undercut assumptions of a stable, harmonious nature and reinforce the idea that mechanism's emphasis on predictability, while still useful, is more limited than previously assumed.

Chaotic ecology thus resonates with deep ecology's principles of the primacy of process over parts, and of imbedded contexts within complex, open, ecological systems. Such science is consonant with deep ecology's vision of a humanity that is imbedded within, rather than apart from, nature.[17]

The Gaia hypothesis of atmospheric chemist James Lovelock offers another biological challenge to the mechanistic model. Named after the Greek earth goddess Gaia, the hypothesis states that "the physical and chemical condition of the surface of the earth, of the atmosphere, and of the oceans has been and is actively made fit and comfortable by the presence of life itself." The biosphere is a self-regulating (cybernetic) system. The hypothesis challenges mechanism by offering the idea that Gaia, as a living earth, is more than the mere sum of its parts. Life itself plays an active role in maintaining the conditions necessary for its own continuation.

Lovelock's central idea is that "the living matter, air, oceans, and land surface form a complex system which can be seen as a single organism and which has the capacity to keep our planet a fit place for life." The atmosphere is not merely a collection of gases in more or less definite proportions, but a biological construction that is an extension of a living system, much like the hair on the back of a cat or the shell of a snail. If even small deviations from the present proportions of gases occurred, it would be a disaster for life itself. Oxygen, for example, composes 21 percent of the earth's atmosphere. This amount represents the safe upper limit in which life can occur; even small increases would lead to an increase in terrestrial fires. At 25 percent the planet would be a raging conflagration extinguishing even the possibility of life.

Other atmospheric gases are maintained by life processes. Methane, produced in the muds of wetlands by anaerobic bacteria, bubbles to the surface where it combines with oxygen to produce water and carbon dioxide, thus preventing the slow build up of atmospheric oxygen concentrations. Nitrous oxide (N_2O) is produced by micro-organisms in the soils and seas. It provides a counterbalance to methane and also regulates the amount of oxygen. Nitrogen, which composes 79 percent of the atmosphere, is produced by denitrifying bacteria which return it to the air. Without life, nitrogen and oxygen would both return to the sea. Nitrogen dilutes oxygen, regulates combustion, and stabilizes climate. Ammonia is also of biological origin, producing rain with a pH of 8. Water, an essential, chemically-neutral substance, returns oxygen to the atmosphere and hydrogen to outer space. The entire

interconnected global system of living and non-living things contains internal feedbacks that keep the chemical percentages within the ranges suitable for life's continuance. Later Lovelock, working with scientist Lynn Margulis of Boston University, extended his hypothesis to include oceans and soil.[18]

The Gaia hypothesis, however, has been criticized as being both teleological and tautological. In 1988, the American Geophysical Union held a conference in San Diego on the Gaia hypothesis that included well known scientists—skeptics who questioned the extreme purposefulness built into the hypothesis, and supporters who explored possible connections with hot springs, the human brain, and the extinction of dinosaurs. James Kirchner of the University of California sees it as a nest of hypotheses ranging from the self-evident to the highly speculative. At the straightforward end of the scale, it simply reiterates the well-documented linkages between biogeochemical and biological processes, while emphasizing the importance of feedback loops between them. At the speculative end is the more questionable concept that biological processes regulate the physical environment maintaining favorable conditions for life. The latter, Kirchner asserts, is untestable, unproveable, and unfalsifiable. Gaia is perhaps nothing but a tautology.[19]

Nevertheless, the Gaia metaphor caught on rapidly during the 1980s as a powerful new image for uniting the combined destinies of people, other organisms, and inorganic substances. Environmental historian J. Donald Hughes looked at Greek ideas of the earth as a goddess and the cosmos as an organism in his 1982 article, "Gaia: An Ancient View of our Planet." The National Audubon Society Expedition Institute, sponsored a 1985 public symposium, "Is the Earth a Living Organism?" that featured papers by scientists, anthropologists, historians, poets, American Indians, and spiritualists. Feminists took up the theory as support for the ancient goddess Gaia (see chapter 5) and opened Gaia bookstores to market goddess statues, books, and records. Musician Paul Winter composed, "Missa Gaia, A Mass in Celebration of Mother Earth," which was recorded live in the Cathedral of St. John the Divine in New York, and in the Grand Canyon. The hypothesis also sparked an array of books that pictured threats to the global Gaian ecosystem, explored scientists' and economists' thoughts on its political implications, and extended the idea to the field of environmental and bioethics.[20]

These new approaches to science are consistent with deep ecology's call for a new metaphysics. They are based on a different set of assumptions about

the nature of reality than mechanism—wholeness rather than atomistic units, process rather than the rearrangement of parts, internal rather than external relations, the nonlinearity and unpredictability of fundamental change, and pluralism rather than reductionism. Yet could a postclassical science embodying such a vision be socially created and accepted? If so, would it provide alternative ethical guidelines for humanity's relationship with the environment?

EASTERN PHILOSOPHY

In many ways the assumptions of the new postclassical science resonate with the much older metaphysical beliefs of ancient Asia: Taoism, Buddhism, Zen Buddhism, Hinduism, and the many sects and traditions within Chinese, Japanese, and Indian thought. Taoism offers an example of an alternative approach to knowledge, ethics, and the study of nature.

In the sixth century BC in China, the "Old Master," Lao Tzu, set down a collection of classic aphorisms known as the *Tao Te Ching* (the Ts are pronounced as Ds), or *The Way*. A contemporary of Confucius who developed a philosophy of practical ethics, over the succeeding centuries Lao Tzu and his Taoist philosophy became associated with "the people," while Confucianism appealed more to China's bureaucratic élite. By the end of the sixth century AD, Taoism was established as a popular cult, infused with alchemy, healing, popular magic, and ultimately with scientific developments such as the magnetic compass and gunpowder. Taoist priests incorporated Buddhist teachings about the afterlife and Nirvana, or eternal happiness. Confucian scholars, who were more concerned with morals, abstract social ethics, and the practice of the good life, looked down on Taoism as a "popular" emotional religion.[21]

The Tao, or the way, is the ultimate reality, the One that underlies the appearances. As cosmic process, it is the way of the universe. Taoists emphasize changes and flows within the whole, observing patterns within the cyclic, ceaseless motion of going and returning, expansion and contraction. Human intellect can never fully grasp the Tao, but people can observe nature to discover its ways. Its nonanalytic, intuitive, scientific approach achieves insights into transformation and change, into growth and decay, life and death through observation of the natural world. Taoist method links opposites, stressing contrary aspects, innate tensions, and spontaneity. Thus yin and yang are polar opposites within constant change. Yang represents the active, yin the

receptive; yang is sunny, yin is shady; yang is light, yin is dark; yang is male, yin is female; yang is firm, yin is yielding, yang is heaven, yin is earth and so on. The body is a balance between yin and yang, inside and outside, back and front. The Ch'i is its vital energy, the continuous flow that connects yang organs by way of yin meridians.

Taoist ethics say that to achieve something, one must start with its opposite. To retain, one must admit the opposite. Action is inaction. One should not force change; instead change stems from within in accordance with the flow of the Tao and the natural order. Good is balanced with bad.

Taoism is a form of dialectical idealism. Mao Zedong contrasted his own Marxian philosophy of dialectical materialism by quoting the Tao's idealist assumptions: "The Tao that can be told is not the eternal Tao; the name that can be named is not the eternal name." The particular is not the reality. The Tao is nameless. It is form without object, shape without shape. "We look at it and do not see it; its name is the invisible, the inaudible, the formless." But like Maoism, Taoism is rooted in the dialectic. The contradictions between two opposites produce change. Being and non-being produce each other. A cup is molded of clay, but its non-being, or hollow space, is the useful part. Long and short, high and low, front and back accompany each other. "To be crooked is to be perfected; to be bent is to be straightened; to be lowly is to be filled; to be senile is to be renewed; to be diminished is to be able to receive."[22]

As in the postclassical process sciences, the Tao is the world's underlying energy. "What the Tao produces and its energy nourishes, nature forms and natural forces establish. On this account there is nothing that does not honor the Tao and reverence its energy." The Tao "produces, but keeps nothing for itself; acts, but does not depend on its action; increases, but does not insist on having its own way. This indeed is the mystery of energy."[23]

What distinguishes Eastern from Western philosophies is often the use of analogy and metaphor rather than abstraction. Eastern thought resists the unifying, abstract, transcendent concepts so characteristic of western science. Rather than theory, it offers a fine-tuned image, instead of argument an inimitable experience, in place of syllogism, an evocative aphorism. Eastern ways of knowing, alternatives within Western philosophy, and the postclassical sciences are some of the sources for deep ecology's challenge to the mechanistic worldview.[24]

CRITIQUES OF DEEP ECOLOGY

"How deep is deep ecology?" asks philosopher George Bradford. Admitting that the "environmental crisis is a crisis of a civilization destructive in its essence to nature and humanity," Bradford excoriates deep ecologists for their lack of a political critique. They fail to recognize that the idea that all things in the biosphere have an equal right to exist is just as much of a projection of human sociopolitical categories onto nature as is the anthropocentrism they criticize. They fail to extend the ecological concept of interrelatedness to technology as a system or to the extractive empire of global capitalism. They take the character of capitalist democracy for granted rather than submitting it to a critique.

Deep ecologists who make a sharp distinction between wilderness and anthropocentrism fail to consider that humans are also animals. Moreover they fail to recognize the ethnocentrism of their own concept of wilderness as devoid of human presence, especially that of aboriginal peoples who for thousands of years inhabited the very lands they now wish to define as wilderness.

Many deep ecologists accept the Malthusian premise that the root of the problem is too many people. Catton, for example, premises the need for a New Ecological Paradigm on the fact that human numbers have exceeded the carrying capacity of the environment. "Population growth," retorts Bradford, "is certainly a cause for concern.…More than 900 million people are presently malnourished or starving, and hunger spreads with rising numbers. But Malthusian empiricism sees many hungry mouths and concludes that there are too many people and not enough resources to keep them alive. Scarcity and famine are thus explained as natural phenomena, inevitable, irrevocable, even benign."[25]

A second critique focuses on the socioeconomic and scientific *naiveté* of deep ecology. Capra's approach in particular, says Stephan Elkins, idealizes culture as the reflection of a society's values and the key to action. Far from examining the ways in which values are related to social structures or analyzing how social structures might change, Capra simply assumes that values and worldviews change over time following cyclical patterns of genesis, growth, maturation and decline. Minority groups with new ideas appear (such as feminists, Greens, and bioregionalists), the old socioeconomic forms disintegrate, and a new cycle begins, as in the current transition to a non-patriarchal, solar age. Change is painless, benign, and independent of political struggle.

Instead, argues Elkins, values emerge from people's everyday experience as formed by their place in class society, not from learning about the Cartesian-Newtonian worldview or the new ecological paradigm. Problems of economic production stem not from our culture's obsession with growth, the desire for indefinite expansion, and consumer inducements to buy and throw away, but from the unequal distribution of private property.

Capra advocates the systems approach of the new ecological paradigm, presenting it as an objective reflection of the systemic wisdom of nature that can provide balance and harmony for society. But science for Elkins is a social product: "A society's view of nature must be seen as part of its self-interpretation, reflecting social relations and its relation to the natural environment." No less than the mechanistic worldview, which Capra criticizes, systems theory is equally reductive, selecting ecological relations as the functions that science mathematically describes. Science, Elkins argues, is thus magically transformed from an inhibiting mechanistic rearguard into a revolutionary life-affirming vanguard. From a force of destruction and domination, it suddenly becomes a source of hope and salvation. The systems-theoretical core of Capra's ecological paradigm, however, can be used, not as a source of cultural transformation, but as an instrument for technocratic management of society and nature, leaving the prevailing social and economic order unchanged.[26]

A third critique of deep ecology comes from ecofeminism (see chapter 8). In "Deeper than Deep Ecology: the Eco-Feminist Connection," Ariel Kay Salleh offers a critique of a critique. Philosopher Arne Naess' use of the generic term "man" in his 1973 paper is more than a semantic or sexist flaw. Although Naess promotes biospheric egalitarianism and a "relational total-field image" (see Table 4.1), he and other deep ecologists fail to see the historical and philosophical connections between the domination of nature by "man" and the domination of women by men. "The master-slave role which marks man's relation with nature," argues Salleh, "is replicated in man's relations with woman." The "anti-class" posture offered by Naess is superficial, ignoring the connection between nature as commodity and woman as commodity in patriarchal society. Moreover, the artificial limitation of the human population advocated by deep ecologists in order to achieve species equality is rationalist and technist. This approach, according to Salleh, contradicts the life-affirming values of both deep ecology and woman as bearer of life.[27]

Another ecofeminist critique comes from philosopher Val Plumwood who argues that Naess's Self-realization in which the individual self is

immersed in and identified with the great Self is too all encompassing and too embracing. Identification and holism neglect difference. The whole, such as a rainforest or planet Earth itself, contains not only magnificent trees, birds, and other life forms, but trash, sewage, and clear-cut landscapes. Both identity and difference are necessary to a new ecological philosophy and ethics. Moreover, highly specific identifications are necessary, such as love of a local landscape, as these emotional attachments may be the prime motivators for an ethic of care. Finally, many ecofeminists argue that deep ecology's anthropocentric critique ignores androcentrism: It is men not women who in fact have historically created and controlled the science and technology that is used to dominate nature. An analysis of patriarchy's role in creating the ecological crisis is likewise critical to a new philosophy.[28]

Could deep ecology be cured of its antifeminist bias through greater sensitivity to its own language and analysis? The answer is no. This would be a mere Band-Aid™. An even deeper social feminist critique exposes the biases in both patriarchy and capitalism. The hegemony of capitalists over laborers depends on the exploitation of nature as a free gift to capital. The hegemony of men over women is necessary to maintain women's double "second-shift" labor in the home and the workplace, whether in capitalist or state socialist societies. A science rooted in the twin assumptions of atomism and objectivity legitimates the domination of both nature and women.

Mechanistic science is patriarchal inasmuch as it has been historically dominated by men who have produced "truths" about reality. The result is dualistic thinking in which the world is interpreted in terms of dominance and submission, objectivity and subjectivity, rationality and emotion, with the first characteristic of each pair being associated with men and the second with women. Women have not participated in the scientific and cultural projects that have defined women's "nature" as emotional, unruly, and subjective and men's "minds" as rational, unbiased, and objective—the epitome of science itself.[29]

RECONSTRUCTIVE SCIENCE

Could there be a science that would be consistent with egalitarian and feminist social values? Much of nineteenth- and twentieth-century science was influenced by the logical positivist philosophy that mathematics and

experimentation lead to certain knowledge of an external real world. Historians and philosophers of science in the late-twentieth century, however, have questioned this positivist approach. Thomas Kuhn's *Structure of Scientific Revolutions* (1962), raised two fundamental questions: Does each age construct its own scientific reality? Does science actually represent progress in the objective knowledge of nature? During the past decade a social constructivist philosophy of science has responded that science is basically a social construction by groups of scientific practitioners who have access to the corporate and governmental systems of power that review proposals and fund research. This school argues that what counts as scientific knowledge is based on: (1) the acceptance by a community of practitioners of what counts as a scientific "fact," (2) the social selection and deselection of facts and theories that interpret natural phenomena, and (3) their inscription into texts accepted as state of the art knowledge by the scientific community and taught to the next generation of scientists. These considerations raise even more radical questions:

1. Can there be a pristine scientific knowledge beyond social, gender-biased, and value-laden processes of scientific investigation and systems of institutional support?
2. Can there be a reconstructed postclassical science and a reconstructive way of knowing nature?
3. Can there be a reconstructed system of knowledge consistent with egalitarian, democratic values that would lead to a sustainable ecology and society in the twenty-first century?

In their book *New Ways of Knowing*, Marcus Raskin and Herbert Bernstein offer a manifesto of reconstructive knowledge. "The world—that is, the world we communicate about—is transformed by description of it. Knowledge workers shape the social organization in which our inquiries about nature take place. And our cognitive understandings of the world are manufactured, indeed, usually *man*-ufactured." A reconstructive knowledge method will be dedicated to the social good, concern with public participation, and the incorporation of humane values into research goals. It starts with choosing a research topic, a small interdisciplinary research group to work on it, and a day-to-day method that is guided by future moral applications. Questions and answers should be based on social realities, not on disciplinary inquiries.

Small groups of researchers from several fields should thoroughly discuss the social and ecological implications of their own projects before undertaking them. Research that denies humanity a future (such as chemical and biological weapons) should not be funded or pursued. Instead research programs that lead to an improvement in the quality of life for disadvantaged groups and the restoration of diversity to the natural world will have priority.[30]

Feminists such as Ruth Bleier, Evelyn Fox Keller, and Sandra Harding likewise emphasize a reconstructive knowledge based on principles of interaction (not dominance), change and process (rather than unchanging universal principles), complexity (rather than simple assumptions), contextuality (rather than context-free laws and theories), and the interconnectedness of humanity with the rest of nature. An ecological approach to problem-solving would be based on human interactions with the nonhuman world, recognition of the imbeddedness of humans in complex biological and social processes, and the context dependence of particular ecosystems in particular times and places. Such a vision of science could contribute to a new relationship with the natural world because it would place humans within it rather than dominant over it and recognize women's roles in the reconstruction of knowledge.[31]

CONCLUSION

The ideas of deep ecology, alternative philosophies, the emerging postclassical sciences, feminism, and reconstructive knowledge point to the possibility of a new worldview that could guide twenty-first century citizens in an ecologically sustainable way of life. The mechanistic framework that legitimated the industrial revolution with its side-effects of resource depletion and pollution may be losing its efficacy as a framework. But a non-mechanistic science and an ecological ethic must be consistent with a new social ecology (see chapter 6) and with feminist values (see chapter 8). It must support a new economic order grounded in the recycling of renewable resources, the conservation of nonrenewable resources, and the restoration of sustainable ecosystems that fulfill basic human physical and spiritual needs (see chapter 9).

Deepest ecology is both feminist and egalitarian. It offers a vision of a society that is truly free. It recognizes that nature is a social construction that changes over time. People have the power to construct nature as a free, autonomous subject, not a dominated object—a nature that is an equal

partner with equal women and men. Deepest ecology also recognizes that science is enmeshed in socially negotiated relationships with nature, relationships that respond to the needs of society. Which research projects are selected and funded depends on social goals; which relations are codified by science depends on social needs. If social goals start with the fulfillment of basic human and quality-of-life needs, then people working together through social movements can create a truly egalitarian, ecological society. Perhaps then nature as equal partner can be healed.

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5

SPIRITUAL ECOLOGY

People are sitting in a circle in a woodland clearing, warm earth below, blue sky above, sun shining through leaves and pine needles. They have just returned from special individual places and have taken on the identities of other natural beings. With paper and paste, colored pens and scissors, they make masks. Passing a smoking shell and a bowl of fresh water, they begin the ritual.

Turning first to the east, then to the other three directions, they invoke the powers of nature. They invite the beings of the Three Times—naming those who have nurtured the earth before, those who are saving it in the present, and those of future times for whom the earth is being preserved. Each being in turn speaks for itself and its kind, telling of its place in the earth's order. "I am rainforest; I am kangaroo; I am mountain; I am lichen." Then a few remove their masks and move into the circle's center to listen as humans to what is happening to the others.

> I am rainforest.…You destroy me so carelessly, tearing down so many of my trees for a few planks.…You cause my thick layer of precious topsoil to wash away, destroying the coral reefs that fringe me.…Your screaming machines tear through my trunks, rip my flesh, reducing me to sawdust and furniture.

After all have listened, a human finally speaks. "We hear you fellow beings. We feel overwhelmed. We need your help. Are there powers and strengths you

can share with us in this hard time?" Each being offers help and shares its gifts with the others, leaving its mask and joining the humans in the center. The humans join together, humming as one organism, then break apart with singing and dancing.[1]

THE COUNCIL OF ALL BEINGS

A ritual of despair and empowerment, the above Council of All Beings was developed by Joanna Macy, John Seed, and others to help people find and act on their own powers to save the planet. From its origins in Australia's movement to save its rainforests, the ritual Council has spread around the world to Tibet, England, California, and onward. The rituals are not intended as a substitute for social action, but as preparation for it. They bring to consciousness the natural history of the planet and convey an authority to act on its behalf. Identification with the earth and its beings empowers each person and removes doubts and hesitations.

Spiritual ecology, like deep ecology, is a product of a profound sense of crisis in the ways that twentieth-century humans relate to the environment. Like deep ecology it focuses on the transformation of consciousness, especially religious and spiritual consciousness. Recognizing the importance of some form of religious experience or worship in the lives of most people, spiritual ecologists attempt to develop new ways of relating to the planet that entail not an ethic of domination, but one of partnership with nature. Religious ideas create strong moods and motivations that act as an ecocentric ethic, guiding individuals and social movements toward new modes of behavior. The ideas of spiritual ecologists thus motivate individuals active in green ecological and ecofeminist social movements (see chapters 7 and 8). Through rituals, a sense of reverence for nature can arise, thereby centering people for social action.

Other rituals reinforce Macy and Seed's Council of All Beings approach. Gaia meditations call upon people to participate in the cycling of the ancient elements—earth, air, fire, and water—through their bodies and lives. Just as water pours in and out of the body and its fluids, so it flows through the earth's springs, rivers, clouds, and rain. Earth, rock, and soil find their way into the body's molecules and cells and they in turn become ashes and dust.

As air is inhaled and exhaled it takes from and gives back to the trees and plants the sustenance necessary for life to continue. The sun's fire, the body's heat, and the cosmic big bang are the same changing manifestations of matter and energy. Each person is part of the long unbroken chain of creation. Consciousness of that history and interconnectedness reinforces belonging and gives strength to act.[2]

In one- and two-day workshops people engage in these rituals and share ecostories of times when they felt the power of the natural world or the pain of what is happening to it. They honor endangered species in a "bestiary" mourning, calling out the names of the species leaving the planetary family forever. During ecomilling, they dance and move in silence, looking, touching, and encountering each other in all their personal vulnerability to the poisoning of the planet and their personal power to heal it. At the end of the workshop people share their reflections and plan subsequent actions and meetings.

Macy's empowerment workshops are based on a 5-pount spiritual response to the pain that so many people feel about the two major threats to the planet: the possibilities for nuclear holocaust and for ecological crisis. The principles on which her work is based are:

1. Feelings of pain for our world are natural and healthy.
2. This pain is morbid only if denied.
3. Information alone is not enough.
4. Unblocking repressed feelings releases energy and clears the mind.
5. Unblocking our pain for the world reconnects us with the larger web of life.

It is through awareness of our human capacity to suffer with the world that we experience dimensions beyond ourselves, and through this ongoing awareness that we grasp the power to heal. "Moving through our pain for our world," Macy states, "is no more our doing as separate egos, than childbirth is the doing of the mother. For it is the deep ecology of life itself, if we let it, that draws us home to the awareness of our true nature and power." Because she believes that our generation's crime against the future is so terrible, Macy proposes that earth burial sites filled with toxic and irradiated materials need to be consecrated as guardian sites where the containers are religiously

monitored and repaired. Much like the communities who have camped at the sites of United States nuclear bases, dedicated surveillance communities must continuously remind us and our descendants of the crippling power of these materials for millennia to come.[3]

NATURE SPIRITUALITY

Do women need the goddess? A resounding, "yes," say many feminists and devotees of new age spirituality. The goddess is an important replacement for the patriarchal symbolism of a male God, the power of which permeates all our cultural institutions, even non-religious ones. "Religions centered on the worship of a male god," says Carol Christ, "keep women in a state of psychological dependence on men and male authority, while at the same time legitimating the political and social authority of fathers and sons in the institutions of society." For women, the goddess is an affirmation of female power and female relationships. She symbolizes their importance as bringers forth of life and their connections with the earth.[4]

A new iconography emerging from festivals, workshops, and conferences brings women in touch with submerged feelings that unite them with the powers of nature. The goddess has become a source of inspiration to female artists, musicians, poets, and actors seeking ways to reimage and heal human relationships with nature. Goddess rituals celebrated at the solstices and equinoxes enhance the personal meanings attached to cycles of life and death, menstruation and menopause. Gloria Feman Orenstein writes: "Through ritual and ceremony, using drumming, dancing, art and music, both women and men have been guided towards a celebration of the Great Earth Mother, Her Mysteries, Her sacred sites, and Her powers.…Contemporary women have both remembered and invented. They have remembered by journeying to sacred Goddess sites and shrines, and they have remembered by entering trance states in rituals of the earth and the moon. They have also invented via intuition and the arts." Orenstein argues that the death of the soul, both cosmic and individual, is a product of Western Enlightenment thinking. Rituals, remembrances, and shamanic guidance can help to recover the lost connections with the earth.[5]

Men too are acknowledging the need for nature symbols in their lives. Many men find in rituals an affirmation of their own connections to nature

and an ethic of caring for the earth. In consciousness raising workshops, men renew their spiritual relationships with nature through taking on the identities of figures of the forest such as the horned god, symbol of a generative creative force in nature—the Greek Pan, the Green Man of Europe, Pan Robin of the Green, the magician Merlin—and through taking on the identities of animals. San Francisco's Harvey Stein invites men to "climb in the body of Geb," Egyptian god of the earth, "live the archetypes of Dionysius the Ecstatic, the Wild Man of the Forest, the Lord of the Animals," and through the Green Man of Europe with his leafy face, to "feel tree and animal life in our bodies." He suggests that patriarchy is oppressive to men as well as women and that men can offer strength and tenderness both to each other and the earth.[6]

Men's movement gurus such as Robert Bly, James Hillman, Robert Moore, and Shepherd Bliss, inspired by mythological meanings in the work of Mircea Eliade, Joseph Campbell, and Carl Jung, facilitate male encounters with their "deep male" selves. Bly believes that men need to get in touch both with their feminine side and with the deeper "wild man" within. Moore sees a need to promote a planetary vision, confront gender antagonisms, and reconcile masculine and feminine in mutual empowerment and cooperation. For Bliss, Orpheus is a male symbol of an earth-dwelling spirituality who contrasts with the transcendent sky gods of Olympus. Using lyre and song, rather than the blade and sword, Orpheus symbolizes gentleness and persuasion, love of beauty, and deep connections between men and nature. In rituals held in caves and woodlands, men (women may also be included) "descend in search of the deep feminine, singing to the goddesses, and we ascend to return to an earthy masculinity to guide us during these turbulent times."[7]

Male practitioners of paganism call on others to protest waste and ecological degradation. Eric Lethe, an environmental consultant and cult practitioner, points out that neo-pagans have a responsibility to call, write, or e-mail manufacturers who produce and package goods that are ecologically harmful. Cult members themselves may strew garbage at gatherings and use craft supplies that are not eco-friendly. Totem animals may be endangered species in need of purifying magic; trees may need healing energies sent their way. Earth's children, he concludes, "should do more to protect and to listen…to Mother Gaia."[8]

The current earth-based spirituality movement is part of an explosion of research on ancient nature religions. Archeologist Marija Gimbutas contrasts

the goddesses and gods of southeastern old Europe during the period 7000 BC to 3500 BC with the sky gods brought by waves of horse-mounted Kurgan invaders from the Eurasian steppes between 4400 BC to 2800 BC. The horticulturalists of old Europe were settled, seemingly peaceful, bands whose life cycle focused on birth, death, and regeneration rituals centered on the female principle. They produced statues of seated goddesses with large bellies, buttocks, and cylindrical necks, woman-bird hybrids, and bird masks. Hybrid male-female and human-animal figures indicate a fusion with rather than a dualism between humans and nature. Other cosmological images, found on vases, lamps, altars, and walls, include spiral snake designs (symbolizing regeneration though skin shedding), "cosmic" eggs with snakes wound around them, fish designs, water birds, butterflies, and bees.[9]

Throughout the ancient world, female deities were worshipped as bringers of natural fertility and were often found in association with male gods. In Mesopotamia, the female fertility goddess Ishtar (Inanna) was worshipped during prehistory, but with the introduction of agriculture and domesticated animals, she was accompanied by her son-lover Tammuz. As the generative power in nature, Ishtar renewed life each spring, descending into the underworld to bring back her dead son Tammuz. In Egypt, Isis was the symbol of the maternal principle who produced vegetation through impregnation by the sun god, her brother and spouse, Osiris. Every spring her tears overflowed, producing the flooding of the Nile. Her flowing gown was decorated with stars and flowers. In one hand she carried a pail, symbolic of the flooding of the Nile, while in the other she shook the sistrum, a rattle which continually agitated the powers of nature. In Greece, fertility rituals were centered on Demeter (the Roman Ceres) and her daughter Persephone (Roman Proserpina). Celebrated at Eleusis, the rites reenacted the abduction of Persephone by Pluto and the wandering of the grief-stricken Ceres during the four months each year that her daughter was lost to the underworld.

Art historian Pamela Berger has traced, through art imagery, the transformation of the goddess from Graeco-Roman protectress of the grain to medieval saint in her book *The Goddess Obscured*. Demeter is depicted with serpents around her arms, holding stalks of wheat. "In ancient Greece Gaia [was] syncretized with Demeter goddess of grain who created plant life, conserved it, and dissolved vegetation in order to renew it." The Roman Terra Mater, shown on a first-century breast plate as a mother goddess with cornucopia,

grain stalks, and children in her lap, appears on a ninth-century book cover with flowing hair, supporting a cornucopia, and welcoming children. In the eleventh century, she appears nursing a serpent and cow and, again, with Adam and Eve on her lap with the snake as the serpent of Eden. In the grain miracle stories, she has been transformed into a saint, protecting the harvest from evil and miraculously causing grain to ripen as she passes. Finally, Mary replaces Demeter as grain protectress.[10]

Images such as these have inspired women artists and performers in the late twentieth century. In *The Once and Future Goddess*, Elinor Gadon skillfully juxtaposes a color plate of the medieval Tellus Mater with Meinrad Craighead's 1980 colored ink drawing of Mother Earth with flowing hair, animals and humans nestled at her feet, offering fruits from her garden. She shows the Stone-Age large-breasted Earth Mother of Willendorf next to a colored photograph of a 1985 performance by Susan Maberry as the earth mother on the day after the nuclear holocaust. The multi-breasted Artemis from the first century is placed beside an illustration of Louise Bourgeois as Artemis from the 1980 performance of "A Banquet/Fashion Show of Body Parts."[11]

Jewish women have found spiritual empowerment in a revival of God the Mother as an aspect of the divine. The Shekinah is the female spirit of God whose presence dwells in human beings. The importance of the Shekinah was recognized in the writings of Jewish rabbis during the exile by the Romans in the first century of the Christian era. It then went underground until the twelfth century when it was revived in the Kabbalah, a mystical form of the Jewish religion. Jewish artist Gila Yellin Hirsch of Los Angeles depicts her power in paintings entitled Shekinah (1976) and Emergence (1981), while Beth Ames Swartz, who traveled to Israel to visit sacred sites of Jewish females, painted The Red Sea (1983) in honor of Moses' sister Miriam.[12]

The presumed dominance and subsequent decline of ancient goddess symbols and nature spirituality in western culture have political implications. Some feminists have used archeological and mythological evidence to argue that societies in prehistory may have been matriarchal, that is, under female political rule. In *The Chalice and the Blade*, however, Riane Eisler uses the same evidence to make a case for dominator versus partnership societies. In her view, matriarchy and patriarchy are both examples of the dominator model, symbolized by the blade, in which the ranking of one sex is higher than that

of the other. The partnership model, symbolized by the chalice, is based on linking, rather than ranking, and offers hope for an egalitarian political and economic society in the future.

Using both feminist theory and cultural transformation theory, Eisler argues that an original partnership society in prehistory took a 5000-year detour into a dominator society. Yet a future society based on a partnership model between women and men and humans and nature may be emerging. In this society the "androcratic virtues" associated with the domination of nature and other peoples will be replaced by "gylanic consciousness." Gylany is derived from the Greek roots, "gyne" meaning woman and "andros" meaning man, linked by the letter "l" from the Greek word "lyein" meaning to resolve or to set free.[13]

THE OLD RELIGION

They gather on hilltops and beaches, in groves and fields, in rented storefronts and condominium penthouses to celebrate the full moon. Taking hands they cast the circle around an altar of flowers and candles, breathing, humming, and moving together to raise power, share it, and then earth it. In turn they face each of the four directions, calling on the goddesses of every tradition to be with them. To the beat of a drum, moving as one long snaking form, they reenact the sacred spiral dance. Some are naked, some remain clothed. The women leave centered and renewed with the energy needed to carry on the ecological work of healing the earth.

Pagan spirituality, or the Old Religion, has been revived in modern times. Wicca is not harmful black magic, but healing, centering power. To witches such as Starhawk and Margot Adler, magic means calling forth the power within, or the art of changing consciousness. A witch bends or shapes the unseen into new forms. The spiritual is the power and the will to change one's own life. To Z. Budapest, women are witches by right of being women. No further initiation is needed. Women form covens for support and consciousness raising—the Honeysuckle Coven of Starhawk, the Susan B. Anthony Coven of Z. Budapest, or the Compost Coven, a men's group. Covens are usually all female, but some are mixed and a few are for men only. Leadership in the covens comes from within each person rather than from power over

others. Each develops her or his own inner strength. Many see these rituals as empowerment for political and social change.[14]

Whether as wicca, healing witchcraft, the religion of the Celtic druids, or as magic, as many as 100,000 people in the United States may practice a form of nature religion, animism, or pantheism based on an alive presence within nature. In her 1998 book *A Community of Witches*, Helen Berger traces the growth of neo-paganism in the northeastern United States over the past thirty years. Most groups share a reverence for nature, an alternative form of spirituality, and a feminist outlook, while striving to create community among members. Most participants view the cosmos as a living whole, draw on a common collection of symbols and rituals, and integrate the personal with the political. In practice, some groups include both men and women, while others are women only.[15]

Ecologically oriented groups have used the lunar or pagan calendars for their gatherings and newsletters. The Elmwood Institute in Berkeley California, dedicated to promoting deep ecology, held new moon gatherings and published its newsletter at the equinoxes and solstices. Earth First!, an activist group issued its newspaper eight times a year in accordance with the pagan nature holidays: Samhain (November 1), Yule (December 21), Bridgid (February 2), Eostar (March 21), Beltane (May 1), Litha (June 21), Lughnasadh (August 1), and Mabon (September 21).

Practitioners of the Old Religion have used rituals and magic in political demonstrations. For example, members of Starhawk's Matrix affinity group protested continuation of research on nuclear weapons at California's Lawrence Livermore Laboratory. Part of a large non-violent protest in which thousands of people were mobilized by the Livermore Action Group during the 1980s, the members participated in training sessions in methods of non-violent resistance. At the June demonstrations, held on the day of the summer solstice, each affinity group of six to eight people joined arms to block an entrance to the laboratory while other protesters urged employees to show support by not going to work. In the 1982 demonstration, members of Matrix created a large web, symbolic of the web of life as well as the power of women and witches. Using chants, spells, and rituals they wove yarn into a large web and embedded it with flowers, seeds, and photographs. When a bus bearing workers approached, they used the web to blockade the road. As some members of the group were being arrested, others tied the web to the

fence. In the 1983 action, one thousand arrestees were held for fifteen days in a large tent while they negotiated the terms of their arraignment and sentencing with authorities. The affinity groups, all trained in nonviolence, operated by a process of consensus decision-making that was energized and unified through rituals led by Matrix.

Starhawk has developed pagan rituals for radical political protest. She was a prominent activist at World Trade Organization demonstrations in Seattle in 1999 and at the meeting of the G8 in Genoa, Italy in 2001 (see chapter 9). Her rituals and articles have helped to galvanize others over the implications of free trade for labor and the environment. She writes: "I was in Genoa. Because of what I experienced there, including the moments of real terror and horror, I am more convinced than ever that we need to stay in the streets. We need to continue mounting large actions, contesting summits, working on the global scale. Our large scale actions have been extraordinarily effective."[16]

Yet the use of goddess spirituality and wicca in radical politics has been criticized. The rituals and meditations, crystals and pentagrams, chanting and drumbeating used at ecological conferences and demonstrations to energize and raise group consciousness are ineffective in dealing with the serious ecological problems facing the planet. Religion is a matter of individual choice and can inspire both personal transformation and political action. But when "spirituality" itself becomes a political principle, objects social feminist Janet Biehl, and is held out as "a key to a better life," it must be scrutinized like any political platform. "A critical analysis of goddess-worshipping spirituality. . . must address not only the content of the specific myth being generated, but also the function of myth as such in an advanced industrial capitalist society."

Moreover, the archeological evidence used by Gimbutas, Eisler, and others to reconstruct goddess-worshipping egalitarian societies in prehistory, argues Biehl, "follows a simplistic philosophical idealism—namely, that cultural symbols determine social realities, confusing religious symbols with religious institutions. They fail to grapple with the question of whether an all pervasive religious authority is really a desirable alternative to a secular society." Some archeologists question the argument that the neolithic culture of Old Europe was changed by a single cause—migration of another people into the area. Others ask whether the expansion of the agrarian neolithic culture was necessarily peaceful, given the existence of arrowheads that could have been

used against people as well as animals. Still others criticize the generalizations on which the arguments for mother goddess worship in prehistory are based. Of the identifiable statues and images in prehistoric art, some 35 percent are female, about 15 percent are male, and the rest are unidentifiable or simply anthropomorphic. While some female images are buxom or pregnant; others are extremely slender. Such observations undercut the presumed universality of the female fertility image. Finally, some women point out that neo-pagan practitioners often ignore the negative implications of goddess-worshipping cultures, including human sacrifice and violence that do not translate into environmental protection or female equality.[17]

NATIVE AMERICAN LAND WISDOM

> When I was small, my mother often told me that animals, insects, and plants are to be treated with the kind of respect one customarily accords to high-status adults. "Life is a circle, and everything has a place in it," she would say. That's how I met the sacred hoop.

Paula Gunn Allen, a Keres Pueblo Indian, writes of the ways of women in her books on Native American stories and rituals. Many Native American tribes were gynocratic, matrifocal, and matrilineal and believed that they were descended from female creator spirits—Grandmother Spider, Spirit Woman, Grandmother Woodchuck, Thought Woman, and so on. Stories passed from mother to child over the generations, taught Native Americans to respect the earth and the entire animate world.[18]

In *The Ways of My Grandmothers*, Beverly Hungry Wolf speaks of the spiritual significance of the annual June Sun Dance camp of the Blackfoot tribe. Awakened each morning in tipis by an old person singing, each grandmother greets the rising sun, calling out the names of her children, grandchildren, great-grandchildren, and friends. She gives thanks for the good things of the past winter and asks for peace for the future. Learning the old ways of the grandmothers means learning which wood burns best, what meat is best to roast, how to dry it properly, how to sew lasting moccasins, and how to put up and heat tipis. It means appreciating the time when women walked long distances carrying loads of firewood and men spent countless freezing days and nights hunting for food to bring home. The Sun Dance camps grow

larger every year as younger people discover spiritual strength in the older traditions.[19]

A generation of ecologically conscious people have found inspiration in Native American beliefs that nature is alive and the earth is a mother. In contrast to Western dualistic philosophies, most native peoples saw no distinction between animate and inanimate, natural and supernatural, body and spirit. The entire natural world was inspirited and sensate. Different entities had differing amounts of power and therefore needed to be treated with respect. From this basic assumption followed certain moral rules for treating nature. Animals, plants, and rocks needed to be addressed respectfully, and use of their names had restrictions. When killed for food, proper spiritual preparations and propitiations had to be made, the capture had to be painless, and the skinning and disposal of the remains done with respect through ritual processes.[20]

Indian orators such as Smohalla of the Columbia Basin tribes, Chief Luther Standing Bear and Black Elk of the Ogalala Sioux, and Chief Seattle of the Suquamish tribe in the Puget Sound area of the present state of Washington have preserved an earth ethic from the past that many people wish to reclaim for the future.[21] The words of Chief Seattle seem to contain the essence of the distinction between the modern American and Native American land ethics:

> Every part of this earth is sacred to my people. Every shining pine needle, every sandy shore, every mist in the dark wood, every clearing and humming insect is holy in the memory and experience of my people.
>
> We know that the white man does not understand our ways. One portion of land is the same to him as the next, for he is a stranger who comes in the night and takes whatever he needs.…He treats his mother, the earth, and his brother, the sky as things to be bought, plundered, sold like sheep or bright beads.

Chief Seattle's words, immortalized in the movie, *Home*, and repeated in hundreds of books, articles, classrooms, and student papers, represent an inspiration to return to a sane, respectful way of living within nature rather than against it.

Yet these words seem not to have been spoken by the great chief after all, but are a third- or fourth-hand version of an oral address delivered by Seattle in 1854, translated on the spot, by an unknown person, from Suquamish into English to Henry A. Smith, M.D. who in 1887 reconstructed it from

extensive notes. Smith's version was later rendered into "better" classical English by William Arrowsmith and then rewritten by Ted Perry as a film script for *Home* produced in 1972 by the Southern Baptist Convention. Many of the words which resonate with modern ecological consciousness are not the original words, but contain phrases and flourishes designed to appeal to ecological idealism and the Christian religion.[22]

Does the shock of such a discovery mean abandonment of Native American land wisdom? Does the argument that native peoples used cliff drives and fire drives in prehistory and guns, snowmobiles, and outboard motors in modern times mean that Native Americans never had or readily abandoned an ethic of respect for nature? Were they propitiating nature out of fear rather than care for the land? No, argues philosopher J. Baird Callicott.

> If some traditional American Indian peoples practiced conservation complemented by a land ethic and maintained a long term balance between themselves and nature, then in [the words of Richard Nelson], "If they can so it, so can we." Their example represents hope. It also represents a role model.[23]

MAINSTREAM RELIGIONS

Mainstream churches have engaged in a variety of activities that both reinterpret the ecological crisis in spiritual terms and attempt to change society through conferences, publications, and projects. Among the Christian denominations with environmental projects are the World Council of Churches, the American Baptist Churches, the United Methodist Church, the Lutheran Church, the Christian Church (Disciples of Christ), the Mennonite Central Committee, the Presbyterian Church, the Reformed Church in America, the United Church of Christ, the Religious Society of Friends (the Quakers) and others.

In addition, a number of churches, divinity schools, and universities sponsor projects and publish newsletters. These include the Commission on Stewardship and Development of the Episcopal Network for Stewardship; the Eco-Justice Project of the Center for Religion, Ethics, and Social Policy at Cornell University; the Center for Ethics and Social Policy at the Graduate Theological Union in Berkeley, California; the Quaker Earthcare Witness (formerly the Friends' Committee on Unity with Nature); the earthkeeping circles of the North American Coalition for Christianity and Ecology; and

the Chicago-based "Web of Creation's" activities for "Transforming Faith-based Communities for a Sustainable World."

Christian ecology sees a responsibility to reinterpret the mandate of Genesis I: 28 to "be fruitful and multiply and replenish the earth and subdue it" as the responsibility to give back to the land whatever is taken from it. This means that the nonrenewable metals should be recycled, that trees should be replanted, and that soil should be conserved. Dominion over the land means that a responsible Christian will care for the land with vision, mercy, benevolence, and compassion. Genesis 2 assigns humanity the responsibility to "dress and keep" the garden. In bringing the fruits of the garden to completion, people must renew the garden and resist the forces that despoil it. The covenant made with Noah was a covenant made with all living things. "Covenant, then includes an all-encompassing respect for the animal and vegetative life of the world, not only because they are created by God, but because they embody something of the divine nature." Stewardship means that humans have a responsibility to take care of the earth and to insure that all its beings function together in an integrated way.[24]

The Eco-Justice Project of the United Methodist Church sets out specific principles for Christian stewardship of the environment. It urges its members to promote government and community efforts to use natural resources responsibly through recycling and conservation and to allocate sufficient funds for reducing the production of toxic and hazardous chemicals, air pollutants, pesticides, and herbicides. It encourages careful stewardship of topsoil, conservation of wetlands, forests, and wildlands, maintenance of the diversity of life, and the preservation of groundwater sources. It urges the ethical and environmental examination of all new technologies and opposes the development of military weapons that would threaten the planetary environment.[25]

Other mainstream religions have also searched their great books for spiritual guidance in dealing with the ecological crisis. Ecological Judaism unites the principle of peace, Shalom, with righteousness, Tzedek. The Tikkun Olam, or the edict to heal the world is extended to repair and heal the environment. The Kosher laws of eating could be extended to forbid eating food whose production is harmful to people, animals, or the land. The holy days and Torah can be used to remind people of their interdependence with nature. "At Pesach we count the Omer, reminiscent of the ripening barley. At Shavuot we celebrate the grain harvest; at Succot the vegetable harvest." The

Tu B'Shvat, or autumnal holiday of the trees can be celebrated as a major environmental holiday.[26]

For Muslim believers:

> Islam…affords a luminous example of the centrality of ecological consciousness embedded in its inalienable view of man as the Viceregent of God on Earth. The Qur 'an teaches that the cosmos, nature, and the environment is full of signs of the Creator.…No religion on earth is so clearly vocative against destruction of domestic and wild life and against decimation of the God-granted natural wealth.[27]

ECOLOGICAL CREATION SPIRITUALITY

"Mother Earth in all her agony," proclaims "post-demoninational" priest Matthew Fox, "is literally crying out to the heavens themselves." Fox, founder of the University of Creation Spirituality in Oakland, California has reclaimed a form of western mysticism and dedicated it to working for social justice and the environment. He sees his Creation Spirituality as a liberating form of worship for the First World akin to Latin America's Liberation Theology. It unifies body and spirit, joins science, art, and cosmology, frees peoples from sexism and racism, and liberates the earth from anthropocentrism. Creation Spirituality honors all of creation as an original blessing. The movement integrates the wisdom of western spiritual traditions and global indigenous cultures with the emerging scientific understanding of the universe and the creativity of art. Fox's principles of Creation Spirituality include:

1. The universe is basically a blessing, that is, something we experience as good.
2. We can and do relate to the universe as a whole since we are a microcosm of that macrocosm and that this relationship "intoxicates" us (Aquinas).
3. Everyone is a mystic (i.e., born full of wonder and capable of recovering it at any age; of not taking the awe and wonder of existence for granted).

Fox's ecological spirituality is rooted in the mystic writers of the eleventh through thirteenth centuries in Rhineland Germany. Three female mystics

and a woman's movement headed by a male spiritual leader offer a philosophy of interconnectedness and reverence for the earth. They include Hildegard of Bingen (1098–1179), Mechtild of Magdeburg (1210–1280), Meister Eckhart (1269–1329), and Julian of Norwich (1342–c.1415). These writers reveal a number of "ecological" themes that inspire respect and reverence for Nature and God's entire creation.

While mainstream Christian religions begin with sin, the creation-centered mystics begin with blessing. Sin is humanity's creation not God's. There is no dualistic separation between a God embodying pure goodness and a deficient, sinful creation, but all creation is itself supremely good, delightful, beautiful, and pleasurable. Each being within it is full of the divine and reveals God's goodness. God is in us and we are in God. Mechtild experienced a spiritual awakening when she saw that God was in all things and that all things were in God. Julian believed that all people were enclosed within God and Hildegard wrote that "God hugs you. You are encircled by the arms of the mystery of God."

In contrast to the patriarchal religious tradition, God, for these mystics, was both mother and father. Eckhart imagined God lying on a maternal bed giving birth, while Julian saw the cosmos as a divine womb in which God was both Father and Mother. God is "our true Mother in whom we are endlessly carried and out of whom we will never come," she wrote. The earth too was holy, not something to be escaped from but embraced. For Hildegard the earth was a mother and living organism in whose body the seeds of all life were contained. The earth was nourished, watered, and made green by the air which was the earth's soul. Eckhart spoke of God as "a great underground river," with the earth as mediator between humans and divinity.

For the mystics, there was no dualism of body and soul as in mainstream Christianity. The body was not an enemy to be despised, but an ally to be celebrated. Eckhart believed that the soul loved the body. It was the soil in which the divine seed was planted. Mechtild admonished that the body was not something to be disdained but a safe haven for the soul. Julian believed in a soul so large that it was an endless world with God in the center. For her, human sensuality was grounded in nature, in compassion, and in grace.

Christ was a cosmic Christ, bringer of justice; the Holy Spirit an outpouring of compassion from God and Christ. Compassion was humanity's origin, destiny, and source of justice. Making justice by way of compassionate

healing was to return the Creator's gifts. Appreciating the thought of mystics such as Hildegard, Mechtild, Eckhart, and Julian, Fox argues, can help to bring an ecological awareness to the Christian tradition. Spiritual ecology is an awareness of the interconnectedness of the whole cosmos, a reverence for the earth, and compassion for all of creation.[28]

The University of Creation Spirituality offers courses on cosmology and spiritual practice that bring together people of diverse religions and professions. While supported by his own Dominican Order, in 1988 Fox was silenced for one year by the Vatican. The grounds for his silencing were based on his references to God as "Mother," denial of the centrality of original sin, and his "fervent" feminism. Fox in turn defended his ideas by reference to the Bible and the Church's own traditions.[29]

ECOLOGICAL PROCESS THEOLOGY

Is Biblical thought ecological? Is the ecological movement religious? Is there an environmentally sensitive form of Christianity? These questions are asked and answered by process philosophers seeking a postmodern ecological worldview. For inspiration and spiritual guidance, they argue, one need not turn to the wisdom of native peoples or to Eastern philosophy, but a meaningful ethic may be found within alternative Western philosophies.

Ecological process theology has been developed by John Cobb of the Center for Process Studies at Claremont College and David Ray Griffin, founder of the Center for the Study of the Postmodern World in Santa Barbara, California and several of their colleagues and students. Cobb and Griffin argue that mainstream Christianity is not ecological and, for the most part, the current ecology movement is not Christian. As Christian theologians, they have rejected both premodern and modern forms of Christian faith. They call for a new postmodern ecological worldview that will supersede the mechanistic, dualistic, positivist worldview of the modern era. The ecological movement is the bearer of this emerging worldview.

Process philosophy owes its origins to British philosopher Alfred North Whitehead, who taught at Harvard University and to Charles Hartshorne, a University of Chicago religious philosopher. It asserts that "process is fundamental. It does not assert that everything is in process…but to be *actual* is to be a process." It challenges the mechanistic idea that an atom or

molecule remains fundamentally the same regardless of its relations. Instead atoms acquire diverse properties in diverse relationships (or contexts). Atoms acquire different properties in different molecular arrangements because the new structures are new environments. Process philosophy thus substitutes an "ecological" theory of internal relations in which entities are qualitatively changed in interactions for the billiard ball model in which entities are like machines—independent and unchanged, affecting each other only through external relations. Atoms and molecules therefore should be viewed not as machines, but as ecosystems.[30]

Process theology holds that God created the world out of chaos (rather than *ex nihilo*) and that each stage in the evolutionary process represents an increase in divine goodness. Each *individual* thing, whether a living organism or an atom, has intrinsic value, and there is a continuity between human and nonhuman experience. One's attitude toward a dog, which is a compound individual, differs from that toward a plant, which is also a compound individual but has no center of enjoyment, and toward a rock, which, as a mere aggregate, has no intrinsic value. All three, however, have instrumental value in supporting each other in the ecosystem.[31]

Process thought is consistent with an ecological attitude in two senses: (1) its proponents recognize the "interconnections among things, specifically between organisms and their total environments," and (2) it implies "respect or even reverence for, and perhaps a feeling of kinship with, the other creatures." Cobb and Griffin argue that process philosophy implies an ecological ethic and a policy of social justice and ecological sustainability:

> The whole of nature participates in us and we in it. We are diminished not only by the misery of the Indian peasant but also by the slaughter of whales and porpoises, and…the "harvesting" of the giant redwoods. We are diminished still more when the imposition of temperate-zone technology onto tropical agriculture turns grasslands into deserts that will support neither human nor animal life.[32]

For Cobb's former student Jay McDaniel, intrinsic value includes the entire physical world. Atoms as individual things have intrinsic value. Rocks express the energy inherent within their atoms. They too have intensity and intrinsic value, albeit less than that of living organisms. Outer form is an expression of inner energy. The assumption that rocks have intrinsic value,

however, does not mean that rocks and sentient beings would necessarily have equal ethical value, but rather that they would all be treated with reverence. This could result in a new attitude by Christians toward the natural world, one that involves both objectivity and empathy.[33]

Philosopher Susan Armstrong-Buck also sees Whitehead's philosophy as providing an adequate foundation for an environmental ethic because intrinsic value is assigned to nonhuman nature. Process is the continuity of occasions or events that are internally related—each present occasion is an integration of all past occasions. Occasions, Whitehead wrote, are "drops of experience, complex, and interdependent." The world is itself a process of fluent energy; actual entities are self-organizing wholes. Differences exist in the actual occasions that constitute each entity. Intrinsic value is not based on an extension of self-interest to the rest of nature, but on the significance of each occasion and its entire interdependent past history. Assigning preferences to biosystems is based on the degree of diversity, stability, freedom of adaptation, and integration of actual occasions inherent in each system.[34]

WORLD RELIGIONS AND ECOLOGY

To coordinate the efforts of world religions in healing the ecological effects of globalization, a series of conferences on the religions of the world and ecology was held in the late 1990s. A goal of the series was to recognize the tensions within all world religions that are both transformative and constraining with respect to reverence for the earth. Religions both shape attitudes toward the earth and promote appreciation for nature. By reflecting on the complexity of the world religions' attitudes toward nature, new forms of ethics can be articulated to protect and preserve other species, ecosystems, and resources.[35]

The wisdom of the world's great religions and the teachings of indigenous peoples were incorporated into the Earth Charter of the United Nations, a final version of which was released in 2000 for endorsement by the UN General Assembly. A follow-up to the Rio de Janeiro Earth Summit of 1992, the Earth Charter sets out goals and principles for a sustainable future. It responds to the fact that humanity is now at "a critical moment in Earth's history" and must choose to "form a global partnership to care for Earth and one another or risk the destruction of ourselves and the diversity of life." The preamble includes a paragraph entitled, Earth, Our Home:

> Humanity is part of a vast evolving universe. Earth, our home, is alive with a unique community of life. The forces of nature make existence a demanding and uncertain adventure, but Earth has provided the conditions essential to life's evolution. The resilience of the community of life and the well-being of humanity depend upon preserving a healthy bio-sphere with all its ecological systems, a rich variety of plants and animals, fertile soils, pure waters, and clean air. The global environment with its finite resources is a common concern of all peoples. The protection of Earth's vitality, diversity, and beauty is a sacred trust.[36]

The World Council of Churches (WCC) is also working toward a new ecological vision that recognizes the interrelatedness of justice, peace and creation and criticizes the ways that globalization not only causes war and violence, but also "affects the environment of our whole inhabited earth." The WCC has released statements on the Kyoto Protocol, and on sustainability for the World Summit on Sustainable Development in Johannesburg. At a gathering of the WCC in Geneva in 2003, representatives of seventy churches discussed globalization and the problems it raises for world prosperity and peace. It opened a dialogue with the World Bank (WB) and International Monetary Fund (IMF). A major concern was that "testimonies and research findings from our sisters and brothers in Africa, Asia, and Latin America show that the harsh economic measures imposed by the IMF and WB as 'conditionalities' for providing loans, debt relief and bailouts in times of crises" have deep adverse effects on the lives of millions of people. The churches noted that "the spirituality of life, which is basic to our Christian faith, is intrinsically at odds with prevailing political-economic arrangements and policies" and that "eventually, nothing less than a fundamental shift in political-economic paradigms is necessary" for achieving "just, participatory and sustainable communities." Toward this end the WCC is committed to ongoing dialogue with the WB and IMF and has declared the decade 2001–2010 the decade to overcome violence.[37]

CONCLUSION

The main project of spiritual ecology is to effect a transformation of values that in turn leads to action to heal the planet. Whatever religion or form of spirituality one practices, it is possible to find a connection to the earth and to

the political work that needs to be done to change the present way of managing resources. Some religions are more radical than others and some envision a more radical political transformation than others. With most individuals practicing some form of religion and with increasing attention to the ecological consequences of current ways of doing business, a spiritual revolution may help to support human and ecological justice in the twenty-first century. Yet skeptics argue that neither deep nor spiritual ecology goes far enough. Only through an economic transformation of the type advocated by the social and socialist ecologists of the following chapter can true ecological justice be attained.

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6

SOCIAL ECOLOGY

Picture a group of eight or ten intense, younger middle-aged men and women dressed indifferently in jeans and slogan-bearing T-shirts, sitting around a cracked Formica™ table under harsh fluorescent light.…The remains of corned-beef-on-rye sandwiches are shoved to one side. Political posters dot the dingy walls. The group is discussing the best strategy to use to mobilize dock workers to support a solidarity strike—to refuse to unload grapes, melons, and cherries grown in Pinochet's Chile. Through the grimy window panes, the sullen outlines of warehouses and factories are visible in the San Francisco fog.

Now picture a group—about the same size—of men and women—about the same age—gathered around a Warm Morning woodburning stove. Under the turned-up sleeves of their Pendleton shirts protrude the men's waffle-weave long underwear.…The women are wearing brightly patterned blouses and long skirts or sweaters and cross-country ski knickers.…A potluck supper of brown rice, lentil soup, and steamed vegetables simmers on the cook stove. They are discussing what crops to plant in their cooperative fields and. . . how best to present the economic advantages of organic agriculture.…Through the tilted panes of the passive solar herbarium, the snow-covered rolling Wisconsin fields sparkle in the mid-afternoon February sun.[1]

PROGRESSIVE ECOLOGY: "MARX MEETS MUIR"

Frances Moore Lappé, author of *Diet for a Small Planet*, and philosopher J. Baird Callicott, champion of ecologist Aldo Leopold's land ethic, set the above scenes and ask "Who could imagine, that these two groups of people could even talk to each other, much less have anything to say?" They then offer ways to unite the traditions of Karl Marx and conservationist John Muir.

Lappé and Callicott see the conflict between social progressives and environmentalists as stemming from seemingly antagonistic perspectives. For environmentalists, the progressive goal of the abolition of poverty and redistribution of wealth seems achievable only if nature becomes a warehouse of raw materials—a passive backdrop to industrialization. Progressives, on the other hand, view environmentalist goals of saving wilderness and improving environmental quality as benefiting white middle-class élites, while alienating the hungry, homeless, and jobless.

Yet underneath the conflict, argue Lappé and Callicott, is a common ethic of outrage over the impact of industrialization on laboring peoples and on nature. Industrial development has brought neither social justice nor a healthy environment to all people. Both the progressive and environmental movements look beyond the individual to the social and environmental whole for values by which to restructure the world. For both visions, the environment and society are the living contexts of life. Species exist in relationship to other biota and the physical environment that sustains them; humans exist as parts of an interdependent social community.

What specifically can the two movements contribute to each other? People working together can create opportunities to keep their own environments clean and to remove neighborhood poverty. But a world in which there is room for both humans and wildlife cannot be achieved by biological methods or social programs alone. Expanding meaningful opportunities for employment, especially for women; food and housing subsidies; and appropriate technologies that can be repaired at the local level are methods that can help to lower population growth rates. Ecologically sensitive agriculture that helps to reduce pesticide residues and water salinization could improve social conditions. A system in which farmers have a personal relationship to their land that continues over time could maintain healthy ecological conditions. Through carefully crafted local programs, a synthesis of progressive politics and social ecology could contribute to a viable world.

Like Lappé and Callicott, many people are searching for ways to resolve the contradiction between production and ecology. Calling themselves variously social ecologists, socialist ecologists, green Marxists, and red greens, they ground their approach in an ecologically sensitive form of Marxism. Social ecologists focus on the relations of production and the hegemony of the state in reproducing those relations. Their ethic is basically homocentric, inasmuch as social justice is a primary goal, but it is an ethic informed and modified by ecological and dialectical science. The analysis of the theorists of this chapter both informs and draws on the actions of left greens, social and socialist ecofeminists, and many activists in the Third World sustainable development movement (see chapters 7, 8, and 9).

MARX AND ENGELS ON ECOLOGY

For most people, Marxism is synonymous with the rigidity and oppression of the bureaucratic states of the Soviet Union, Eastern Europe, and China. Moreover, Marx's prediction that capitalism would generate economic and social crises that would lead to socialist revolutions in capitalist countries, led by the working classes, has not been borne out. Marx's emphasis on the law-like characteristics of a society's economy placed less stress on the role of social movements, politics, culture, and consciousness in transforming society than on the overthrow of the mode of production. Since the 1960s, however, Marxist theorists have emphasized the processes by which people are socialized through gender, race, and class and the ways in which social movements can identify and alter those patterns. Many groups, including the New Left, democratic socialists, socialist feminists, and racial and religious minorities have found insights in the writings of Marx and Engels that promote goals of liberation, freedom, and economic equality. The same is true of ecological Marxists, who emphasize not the control and domination of nature, but rather the ways in which ecological theories and green social movements can help to transform people's consciousness and practices toward nonhuman nature.[2]

Although Marx and Engels certainly argued that the domination of nature through science and technology would relieve humankind of the "tyranny" imposed on it by nature in procuring the necessities of life (food, clothing, shelter, and fuel), they were also acutely conscious of the "ecological" connections between humans and nonhuman nature. Like many critics today,

they reacted against the mechanistic worldview of the seventeenth century. This mechanical materialism assumed that matter was made up of inert atoms and that all change was externally caused. Perception is explained as the result of corpuscles of light hitting an object such as a table or pencil, entering the eye, and being recorded as an impression on the brain. The individual is the passive receptor of information, just as the worker is the passive receptor of the capitalist's decision to offer minimal wages. Any worldview that casts the laborer as a powerless recipient of the ideas of a controlling élite is not healthy for her or him.

Similarly, the alternative view, prevalent in Marx's time, that the world was fundamentally spirit or idea, working itself out through history—the view of German philosopher Georg Hegel—was equally problematical. This worldview likewise rendered laborers powerless to change their destinies. What both the mechanists and the Hegelians had left out of their philosophies were social relations. People are born into a given type of society at a given time in history. Their place in that society is the perspective from which they view the world. Those in control of the society—the élite—will use the worldview to justify and maintain their hegemony. But laborers, artisans, minorities, and the poor have a choice of ways in which to view the world. They do not have to accept the mechanistic philosophy that renders them passive receptors of knowledge. More compatible with their social needs is a worldview that makes change, rather than *stasis*, central.

In arriving at a theory of social change, Marx borrowed from both of the schools he rejected. With the mechanists, he asserted the reality of the material world. Matter and its manifestations in natural resources, food, clothing, shelter, and the essentials of life were real. Yet changes in the material world were not external to it, as mechanical materialism held, but internal. With Hegel, he asserted that the process of change was dialectical. The material world is continually in a process of change. This is because every event has both positive and negative forces. Everything is also not something else. It *is* by virtue of what it *is not*. The real can be defined only through contrasts. Each thing, therefore, is also its opposite. This tension, or contradiction, between a thing and its opposite destroys both and creates something new. Being (the thesis) inherently contains its own contradictions, not-being (the antithesis), and the tensions between them are a new becoming (the synthesis).

Through this dialectical process, humans make their own history. The élite society of Greece that developed philosophy and democracy, did so only

because of its simultaneous dependence on slavery and sexism. The contradictions between freedom and unfreedom, between élite domination and dependency on the dominated eventually led to the downfall of the ancient social system. Medieval feudalism contained a similar contradiction between free lord and unfree serf; yet serfs, unlike slaves, had certain rights to natural resources and the manor commons. Without the serf to make in-kind payments of food and fuel, the lord by definition would not be lord. Similarly, capitalists depend on wage laborers and vice versa, but the mutual contradictions between their interests create tensions that lead to social transformation. Today, the economic dependencies of the First World on the natural resources and labor of the Third World create similar patterns of dominance. As dominators, we are ourselves dominated because of our dependence on the dominated.

Seeing the world as fundamentally process and change, however, has implications not only for society, but also for nature. Marx, in his *Economic and Philosophical Manuscripts of 1844*, recognized the interdependence of humans and nature, an idea now central to the ecological vision. People, he asserted, were active natural beings who were corporeal and sensuous and who, like animals and plants, were limited and conditioned by things outside themselves. They were both different from these objects and yet dependent on them. "The sun is the object of the plant—an indispensable object to it, confirming its life—just as the plant is the object of the sun, being an expression of the life-awakening power of the sun." Like today's ecologists, Marx recognized the essential linkages between the materials that make up the human body and nonhuman nature. "Nature is man's inorganic body," he wrote. "Man lives on nature—means that nature is his body, with which he must remain in continuous interchange if he is not to die. That man's physical and spiritual life is linked to nature means simply that nature is linked to itself, for man is a part of nature."[3]

Humans, however, differed from other animals in the way in which they obtained the essential food and energy to continue living. What distinguished humans, thought Marx and Engels, was their capacity to produce, using tools and words. The tools of animals were, in most cases, parts of their bodies, with inconsequential effects on nature. Humans, by contrast, transformed external nature with instruments that were socially organized. In different periods in history, humans organized their instruments and labor into different modes of production. Gathering-hunting, horticulture, feudalism, capitalism, and

socialism are different modes of production that transform nature in different ways.

Essential to the "ecological" vision of Marx and Engels is their study of the history of human interactions with nature. Early societies, they argued, had a different relationship to nature than do capitalist societies. While pastoral societies wander, taking from nature that which is necessary for life, horticultural societies settle down and appropriate the earth's resources for their own sustenance. Humans thus modify external nature, using the local climate, topography, and flora and fauna for their own purposes. The settled community uses the earth as "a great workshop," for its labor. Human labor, on the one hand, and the earth with its soils, waters, and organic life as instrument of labor on the other hand, are both necessary for the reproduction of human life. Humans, isolated from society, would live off the earth as do other animals.

For the earth to be appropriated as property humans must settle on the land and occupy it. Under capitalism, the earth is bought and sold as private property. Here, according to Engels, the earth is peddled for profit. "To make the earth an object of huckstering," he wrote, "—the earth which is our one and all, the first condition of our existence—was the last step toward making oneself an object of huckstering." It is the ultimate in alienation. In the capitalist appropriation of the earth for profit, raw materials, taken from the earth, such as coal, oil, stone, and minerals, are the result of natural forces. They are the "free gift of Nature to capital." Nature produces them and the capitalist pays the laborer to transform them. Similarly, physical forces, such as water, steam, and electricity cost nothing. Science, likewise, costs capital nothing, but is exploited by it in the same manner as is labor.[4]

But these modes of transforming nature have unforeseen side effects. Like modern ecology, which is premised on the concept that everything affects everything else, Engels noted in his *Dialectics of Nature* that "in nature nothing takes place in isolation. Everything affects every other thing and vice versa, and it is mostly because this all-sided motion and interaction is forgotten that our natural scientists are prevented from clearly seeing the simplest things."

Engels warned that people should not boast about their ability to master nature because there were always harmful consequences of such conquests. Goats grazing on Greek hillsides prevented forests from regenerating

themselves. Sailors arriving on Greek islands introduced goats and pigs that destroyed native vegetation and prepared the way for cultivated crops and weeds that obliterated native species and even the wild ancestors of grains. In Mesopotamia, Greece, and Asia Minor, those who cut down forests to plant crops did not predict that they were simultaneously destroying the collectors of moisture on which the land depended. The Italians who cut down fir forests in the Alps did not realize that they were destroying the watersheds on which the dairy industry they were introducing depended and, at the same time, creating the conditions for flooding the plains below. When the potato was introduced into Europe from the New World, those who did so did not consider the possibility that they were simultaneously spreading the disease of scrofula. Spanish planters in Cuba, who burned forests on steep mountainous slopes for one generation's worth of coffee profits, did not care about the erosion and ruined soil that took its toll on those that followed.[5]

"Thus at every step," Engels admonished, "we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature—but that we, with flesh, blood, and brain, belong to nature, and exist in its midst, and that all our mastery of it consists in the fact that we have the advantage over all other creatures of being able to know and correctly apply its laws." The more one understands the laws of nature and the consequences of human actions, he went on, the more humans will come to "know themselves to be one with nature," and that there is no inherent "contradiction between mind and matter, man and nature, soul and body." These dualisms originated in the philosophy of ancient Greece, were reinforced by Christianity in the Middle Ages, and codified by the philosophers and scientists of the seventeenth century. Their dissolution is one of the goals of the radical ecological and ecofeminist movements today.[6]

In *Capital*, Marx analyzed some of the "ecological" side effects of the capitalist mode of production. He argued that capitalist agriculture, much more than communal farming, wastes and exploits the soil. In agriculture geared toward production for profit, the soil's vitality deteriorates because the competitiveness of the market does not allow either large-scale owner or tenant farmer to introduce the additional labor or expense needed to maintain its fertility. The agricultural population declines as the industrial-urban population mounts, and as Marx noted (following nineteenth-century chemist Justus Liebig), the marketed produce carries with it the molecules of soil-building

nutrients. Large-scale agriculture and large-scale industry mutually support the enervation of both laborer and soil, breaking "the coherence of social interchange prescribed by the natural laws of life."

Capitalist agriculture, Marx observed, is progress in "the art, not only of robbing the laborer, but of robbing the soil; all progress in increasing the fertility of the soil for a given time, is a progress towards ruining the lasting sources of that fertility." It progresses only "by sapping the original sources of all wealth—the soil and the laborer." Small farming is not feasible because there is insufficient land for all to be rural land holders. Moreover, the labor of the small farmer is isolated from the larger society. Under communal production, however, there is the possibility of "conscious rational cultivation of the soil as eternal communal property, an inalienable condition for the existence and reproduction of a chain of successive generations of the human race."[7]

Industrialization, according to Marx, resulted in similar "ecological" problems. Wastes from industry and human consumption accumulated in the environment and were not reused by the capitalist unless the price of raw materials soared. Marx gave numerous examples of capitalist pollution: chemical by-products from industrial production; iron filings from the machine tool industry; flax, silk, wool, and cotton wastes in the clothing industry; rags and discarded clothing from consumers; and the contamination of London's River Thames with human waste. Yet this waste that clogged and polluted waterways was very valuable and had the potential to be recycled by industry. The chemical industry could reuse its own waste as well as that of other industries, converting it into useful products such as dyes and rugs. The clothing industry could improve its use of the waste through more efficient machinery. Human waste could be treated and used to build soil fertility. An "economy of the prevention of waste" that reused all waste to the maximum was required.[8]

Marx assumed a two-level structure of society: the economic base or mode of production (which consisted of the forces and relations of production) and the legal-political superstructure (Figure 6.1). Together these constituted the social formation. Different modes of production, such as primitive communism, ancient, Asiatic, feudal, capitalist, and socialist, had different legitimating superstructures. Marx's theory of social change was based on a conflict between the material forces of production and the social relations of production. This dialectic initiates an era of social revolution

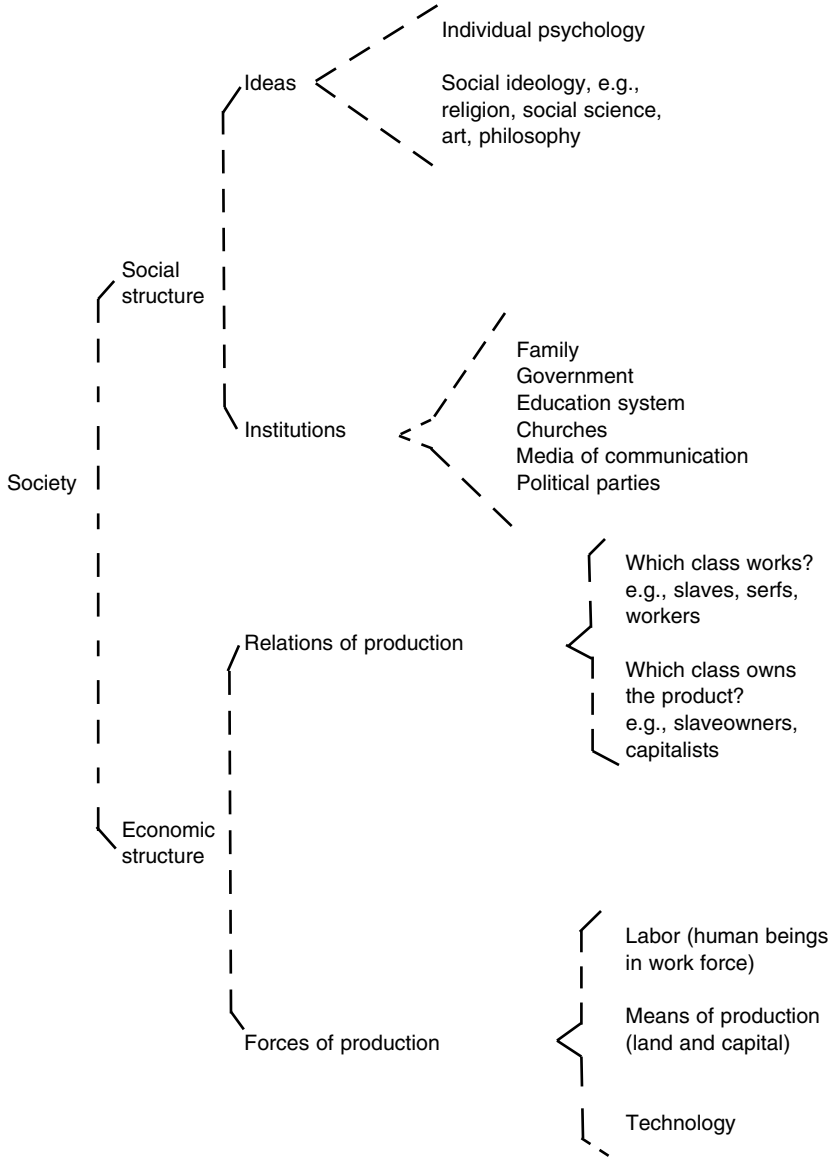

Figure 6.1 Marxist Framework of Social Analysis

Source: Howard Sherman, *Foundations of Radical Political Economy* (Armonk, NY: M.E. Sharpe, 1987), 44, reprinted by permission.

in which the economic foundation breaks down leading to a change in the superstructure. Today social ecologists envision a transformation of the global capitalist economy and its legitimating mechanistic worldview to a sustainable economy and a process-oriented ecologically-based science. It would be brought about by social movements, especially those concerned with environmental health and quality of life.

ANARCHIST SOCIAL ECOLOGY

Current theories of social ecology draw on Marx and Engels' approach to "ecology" and society. Additionally, social ecologists draw their ideas from premodern tribal societies, Eastern cultures, and from analyzing the ecological problems of capitalist, socialist, and Third World countries. For anarchist philosopher Murray Bookchin, social ecology is rooted in the balance of nature, process, diversity, spontaneity, freedom, and wholeness. His ideal society would eliminate all hierarchies in ecology and in society. The ecological society of the future would reclaim the fundamental organic non-hierarchical relationships of preliterate peoples. This would not be a return to a foraging economy or to a "primitive" past, however, but a movement beyond capitalism and toward a society free of the domination of human beings and the exploitation of human labor. Above all, it would value human reason and human freedom.[9]

Early preliterate societies, Bookchin argues, were organic. Although there were differences based on age, gender and kinship, such societies saw themselves as neither superior to nor inferior to nonhuman nature. They were within nature. Their differences with each other and with nature constituted what Hegel called a "unity of differences," or a "unity of diversity." Male decision-making roles in the civil sphere were balanced by the power of women in the domestic sphere. Women's central role in foraging and horticulture offset men's role in hunting. With the continuing influence of elders, however, male authority and prestige increased and organic society broke down. Hierarchy destroyed the original egalitarian balance; males became dominant over females and children. Scarcity and warfare escalated the problems created by the twin pillars of dominance and hierarchy, and non-egalitarian culture continued in all subsequent societies. Today dominance and hierarchy permeate all aspects of life, especially in the dominance of the intellectual over the physical, work

over pleasure, and mental control over sensuous body. A major goal of social ecology is to abolish these dualisms.[10]

Capitalism not only reinforces such dualisms, but it stands in fundamental contradiction to the autonomy of the natural world. Its growth-oriented imperative drives society ever more deeply into the devastation of nature. Pollution, radioactive fallout, toxics in food, and environmental degradation are all inevitable products of capitalist development. Capitalism has not only created a totally synthetic environment, but has demonstrated a remarkable resilience and ability to absorb ideas that seem opposed to it. It embraces any religions and forms of spirituality as long as they do not challenge its dominance.[11]

In an ecological society, Bookchin argues, dominance and hierarchy would be replaced by equality and freedom. An "ecology of freedom" would reunite humans with nature and humans with humans. This would be achieved through an organic, process-oriented, dialectic that would reclaim the outlook of preliterate peoples. The merging of their ecological sensibility with the analytical approach of western culture would produce a new consciousness. Thus the advances of science and technology could be retained and infused with an ecological way of living in the world. This approach recognizes the mutual dependence of humans and nonhuman nature. The ecology of freedom is rooted in a concept of ecological wholeness that is more than the sum of its parts. "Unity in diversity" means the unfolding of the processes of life. Bud is replaced by flower and flower by fruit, as moments in an emerging unity. Spontaneity is the continual striving of nature toward change and of humans toward greater self-awareness and freedom.

Bookchin distinguishes between ecology and environmentalism. Environmentalism adopts the mechanistic, instrumental outlook of the modern world that sees nature as a resource for humans and humans as resources for the economy. Nature consists of passive resource objects in habitats constructed for human benefit. Environmentalism does not question the status quo, but facilitates the domination of humans over nature and humans over other humans. Ecology, premised on interactions among the living and non-living, contains the potential for an alternative. Social ecology incorporates humans and their interdependences with nonhuman nature. Bookchin uses the term ecosystem to mean "a fairly demarcatable animal-plant community and the abiotic or nonliving factors needed to sustain it." Extended to society, it

becomes "a distinct human and natural community, [including] the social as well as organic factors that interrelate with each other to provide the basis for an ecologically rounded and balanced community."[12]

Social ecology studies the patterns that make up the natural/social community, attempting to discern its history and inner logic. It uncovers the rich variety and diversity that are present in the community's evolution. An ecological approach to community leaves room for spontaneity, both in nature and human nature. Biological and evolutionary forces that have resulted in the diversity found in nature must be fostered rather than controlled. Management should be like steering a ship by knowing the direction and strength of the current, waves, and winds, rather than a total domination oriented toward human benefit.

An ecological perspective challenges hierarchy in nature. An ecosystem is a food web, not a food pyramid with humans at the top. Each species is equal to every other species and to the abiotic elements that keep its cycles of life and death and predators and prey in motion. A process of development takes place in nature, "the result of an immanent dialectic within phenomena." Thus human communities and natural ecosystems interact with each other as they evolve. Not only do humans transform nature, but nature also transforms humans. Humans are the result of an evolutionary past that includes a primate and animal ancestry as well as a social ancestry. Social evolution took place within specific ecosystems. Nature is not just the passive receptor of human action, but the active transformer of human labor. Thus "nature interacts with humanity to yield the actualization of their common potentialities in the natural and social worlds."[13]

What does all this mean for the future? The world may continue down its present path toward destruction. Or, on the contrary, a reconstruction is possible in which humanity can transform its relationship to the natural world. "Our world," Bookchin believes, "will either undergo revolutionary changes, so far-reaching in character that humanity will totally transform its social relations and its very conception of life, or it will suffer an apocalypse that may well end humanity's tenure on the planet."[14]

To avoid the ultimate ecological collapse, Bookchin argues, humans must recognize and live within the requirements of bioregions. The ecosystems within bioregions limit the range of human options to control nature. Technologies, agricultural practices, and community sizes appropriate to the specific conditions of the bioregion are needed. Sufficient decentralization

to avoid pollution and yet maintain and restore the region's native plant and animal life, along with new social institutions compatible with an ecological sensibility are also necessary. Diversity within the bioregion must be encouraged to reverse present trends toward crop monocultures, urban concrete, and mass culture, wiping out eons of evolution overnight. In confronting the stark possibility of the end of diversity, humans must open their imaginations to utopian visions.

Social ecology has a deep commitment not only to reversing the domination of nature, but also to removing social domination. Hierarchical and class inequalities have resulted in homelessness, poverty, racial oppression, and sexism. Of particular concern are forced and insensitive methods of controlling populations, rather than restructuring and redistributing food, clothing, and shelter.

To achieve a truly democratic, egalitarian society, Bookchin espouses a politics of libertarian municipalism—a face-to-face democracy grounded in popular assemblies wherein people make decisions about their own lives, economies, and ecologies. Power is vested in the people themselves as individuals who build a communalism from the local level upward through confederally organized popular assemblies. Decisions are made by interdependent self-governing municipalities, such as the New England town hall meeting. Bookchin's version of anarchism is rooted in democratic community-based decisions arrived at by majority vote. "Majority voting is not only the fairest but the only viable way for a face-to-face democratic society to function, and…decisions made by majority vote should be binding on all the members of the community, whether they voted in favor of a measure or against it."[15]

Each municipality has a responsibility to all other municipalities within the larger confederation to which it is bound through an initial agreement. That agreement is a compact, or constitution, arrived at by empowered people, which is binding and indissoluble. A community cannot simply state it is leaving the confederation if it does not agree with a particular decision reached by majority vote. "A community shouldn't be able to say, for example, 'We want to exclude black people, but you in the confederation would force them on us, so we are going to defy you and leave the confederation.'" Such a confederation differs from a state in that power comes from below and is vested in the people and the municipality rather than in state rule. "I reject the…totalitarian notion of total dependence upon the state," Bookchin argues. "I am for interdependence among self-governing people

in assemblies." Problems arise from top-down state power and autocracy, as opposed to bottom up, democratic decision-making.[16]

Bookchin argues that certain deep ecologists (see chapter 4) are insufficiently sensitive to social issues, especially regarding population, race, class, and sex. This includes some, although by no means all, supporters of Earth First!, the spiritual Greens, some bioregionalists, and some spiritual ecofeminists. To speak of a global population problem as threatening wilderness and the entire biosphere is incorrectly to analyze the roots of ecological problems by disregarding the differential impact of economic growth, especially capitalist growth, on indigenous people, marginalized rural and urban people, people of color, and women.

Social ecologists decry the idea of involuntary methods of population control, the Malthusian idea that famine, disease, and war are positive checks on population expansion, and the policy that immigration of southern and eastern hemisphere people into northern countries should be tightly restricted. Instead they support an ecologically-based development policy that uses resources in a sustainable way while raising the quality of life and redistributing the means of fulfilling basic needs. The debate between deep and social ecologists highlights differences of opinion on where to place the core of the analysis as well as approaches to solutions. Social ecologists tend to see the problem as rooted in the dialectic between society (especially economies) and ecology, whereas deep ecologists focus on the conflict between the ecological and mechanistic worldviews. Similarly, for social ecologists, action must be focused on ecodevelopment and social justice as opposed to the deep ecologists' goal of transforming the worldview and reclaiming spiritual connections to the earth.

SOCIALIST ECOLOGY

Another alternative rooted in the Marxist tradition is socialist ecology. Socialist ecology offers an eco-economic analysis of the interaction between capital and nature and the transition to a post-capitalist society. Instead of Bookchin's emphasis on hierarchy and domination, a utopian anarchist society modeled on "nature," and a Hegelian dialectic, it envisions an economic transformation to ecological socialism, initiated by new green social movements.

Socialist ecology is spearheaded by economist James O'Connor, author of *The Fiscal Crisis of the State* and other books on economic crises. Rooted in Marx's conceptual framework, it nevertheless goes beyond Marxism to incorporate concepts of ecological science, the social construction of "nature," and the autonomy of nature. It argues that the environment and ecology are the key issues for the late-twentieth and twenty-first centuries, as evidenced by the global ecological crisis and the rapid growth of green social movements, ecofeminism, working-class anti-toxics crusades, and farm–worker anti-pesticide coalitions. It encourages an analysis of the dialectics between economy and ecology and between nature and history. Additionally, it offers a critique of existing socialist societies which have failed to address the ecological crisis and fosters thought about a reconstructive ecological socialism. In addressing the general problem of capitalism, nature, and socialism, it encourages dialogue among Marxists, Marxist-feminists, ecological Marxists, post-Marxists, left-greens, red-greens, and others.

O'Connor's theory of capital and nature is grounded in the traditional Marxian dialectic between the forces of production (technologies) and the relations of production (exploitation of labor by capital). This dialectic is the first contradiction of capitalism and leads to economic crisis and the breakdown of capitalism. But O'Connor equally emphasizes a second contradiction within capitalism, that between production and the environmental conditions of production (Figure 6.2). Marx and Engels used the term conditions of production to encompass human resources (labor), natural resources, and space. In ecological Marxist theory, these conditions of production come into conflict with the forces/relations of production. This second contradiction of capitalism leads to eco-economic crisis, initiating the transition to ecological socialism.[17]

Ecology is the basis of three conditions of production. First are the external physical conditions, what Marx called the natural elements entering into capital. Examples are the health and viability of ecosystems, such as the adequacy and stability of wetlands and the quality of soils, waters, and air. Second are the personal conditions of the laborers. Examples are the health of workers, as affected by the environment. Toxics and pesticides in the workplace, smoggy air and polluted water, unpleasant surroundings in the work environment, all affect the well-being of workers. Third are the social conditions of production, such as the means of communication among workers and managers.

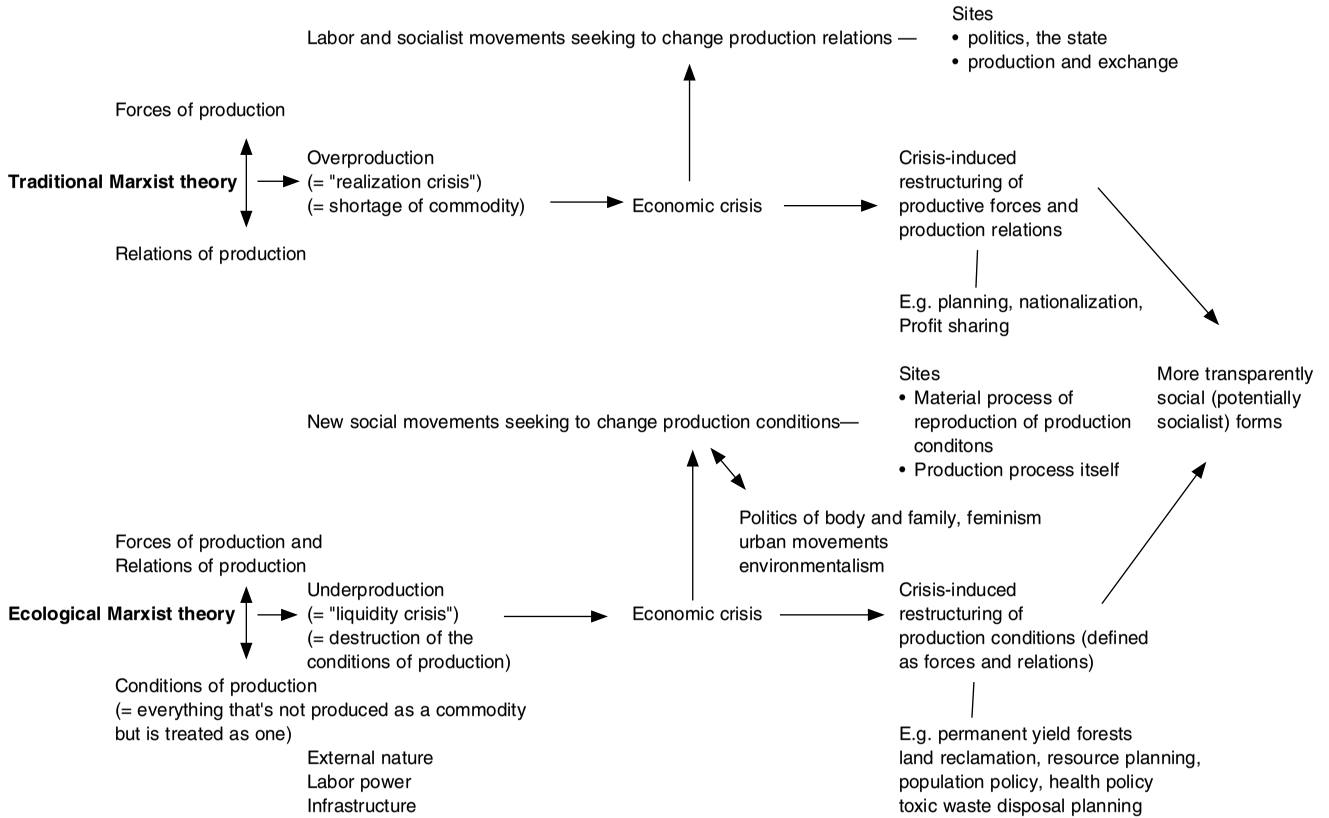

Figure 6.2 Socialist Ecology

Source: Diagram by Yaakov Garb based on James O'Connor, "Capitalism, Nature, Socialism: A Theoretical Introduction," 1 (Fall 1988): 11–38 (as modified by James O'Connor in *Natural Causes: Essays in Ecological Marxism* (New York: Guilford Press, 1998), 172, used by permission.

In traditional Marxist theory, the first contradiction of capitalism leads to overproduction of goods. There is a decreased demand among consumers for the product. In ecological Marxist theory, however, the second contradiction of capitalism leads to underproduction. Capitalism creates its own barriers to growth by destroying its own environmental conditions of production. Ecologically destructive methods of agriculture, forestry, and fishing raise the costs of raw materials that lead to the underproduction of goods and the underproduction of capital. Soils are depleted, waters are polluted, workers' health fails, yields of produce, meat, wood, and textiles decline. In its hunger for profits, capitalism thus destroys its own ecological conditions of production. Rather than leaving nature free and autonomous, capitalism recreates it as capitalized nature—a second nature treated as commodity and subjected to ecological abuse.

In traditional Marxism, the agencies of social transformation are the traditional labor and socialist movements that change the relations of production, through collective bargaining for example. Here economic crises make it possible to imagine the transition to socialism. In ecological Marxism, instead, the agencies of social transformation are the new ecological social movements: environmental health and safety, farm–workers' anti-pesticide coalitions, ecofeminist protests over groundwater toxins, left-wing green parties, and so on. Here it is ecological crises that make it possible to imagine the transition to socialism. Such crises and social movements push capitalism to respond in more transparently social and potentially socialist ways. In turn, capitalism responds by introducing more environmental and natural resources planning—sustained yield forests, environmental health policies, toxic waste disposal practices, and so on.

But in imagining the transition to an ecological socialism, socialist ecology criticizes state socialism, arguing that this is not what the new vision entails. State socialist societies have created ecological crises and fostered ecologically destructive policies, as have capitalist societies. Their planning processes nationalize production rather than democratizing and socializing it. They stifle individual creativity and are bureaucratically inflexible. They abuse and deplete nature as do capitalist societies, but do so not because of the profit-motive, but because their commitment to full employment stifles appropriate technologies and permits pollution.[18]

In an ecological socialist society, nature will be recognized as autonomous, rather than humanized and capitalized. Ecological diversity, an ecological sensibility, and a science of survival based on the interrelatedness of living organisms and the environment will all be needed and valued.

What is an example of such an ecology of survival? One such case history is the use of biological insect controls in Nicaragua. Before the Nicaraguan revolution of 1979, agricultural production was dependent on heavy applications of pesticides to produce high cotton exports. Broad spectrum chemicals destroyed natural insect enemies, created new chemically-resistant pests, and caused high numbers of pesticide poisonings among workers. A pesticide treadmill set in, in which a cotton export economy became dependent on increasing amounts of pesticides to maintain yields, fueling the profits of foreign chemical companies. After the overthrow of the Somoza regime, the new socialist government stepped up the use of Integrated Pest Management (IPM) techniques and revolutionized the forces of production.

IPM uses biological methods of controlling insect pests as its core. It depends on the careful monitoring of pest levels by trained field aides who assess when the economic threshold of pest damage has been reached, as opposed to spraying broad spectrum chemicals on predetermined calendar dates. Pesticides are applied only in limited amounts and in narrow ranges. Plants are cut and plowed under the soil between seasons to avoid carryover of pests. Before the Sandinista revolution, regional IPM programs had been difficult to implement because not all capitalist growers in an area cooperated. The restructuring of farms under the new government created new relations of production which allowed new forces of production such as IPM to take root. These new productive forces fostered better conditions of production by improving both the health of the soil and the health of the workers. The government was able better to plan production, train IPM field hands, save on the enormous costs of pesticides, and achieve higher yields. IPM as a force of production creates independence, as opposed to chemical-company dependence, and creates jobs for field workers. IPM continued to be used in Nicaraguan agriculture after the defeat of the Sandinistas in the elections of 1990, 1996, and 2001. Funding from outside the country allows external monitoring and evaluation of the method. Thus, despite increasing dependence on world markets and politics the Sandinista contributions to IPM have achieved some successes.[19]

DIALECTICAL BIOLOGY

Does social ecology go beyond applied sciences, such as IPM, to include scientific method itself? In *The Dialectical Biologist*, Richard Levins and Richard Lewontin argue that science done in the style of Marx and Engels is based on different assumptions than those of mechanistic science. Whereas mechanism is Cartesian, reductionist, and positivist (i.e., based solely on the validity of empiricism and mathematics), a dialectical perspective on science emphasizes change, historicity, and social construction. What is accepted as knowledge in any given period changes over time. What is socially and politically acceptable in any given society sets the goals and parameters of scientific investigation.

Dialectical science is based on four assumptions about the nature of reality. First, the whole is a relation among parts, rather than a sum of basic elements. These parts do not exist apart from the whole, but only in relation to it. Second, the properties take their meaning from the whole. They exist only in interaction with it. A person acquires the property of flying only in relation to a social-technological system of aluminum extraction and construction, petroleum, and pilots. Third, parts and wholes interpenetrate. Causes become effects, subjects become objects and vice versa. The environment shapes the individual and the individual shapes the environment. Both nature and people are actors in the making of history. Fourth, change is primary. It is the fundamental constant. Stability is only a momentary balance. In every object there are oppositions and contradictions that bring about change. Harmony, stability, balance, stasis, equilibrium, adaptation, and so on are illusions. Even the so-called fundamental constants of science, such as the mass of the electron and Plank's constant may change slowly over eons. If so, present assumptions about the origin and evolution of the universe could be seriously challenged.

To say that science is socially constructed is to recognize that scientists, like everyone else, bring to their work a set of assumptions about the world. While scientists try to be explicit about the mathematical and empirical assumptions and the laws that underlie their scientific papers, they are influenced by other implicit assumptions about society and the world that help to determine the kinds of research problems that are investigated and funded. The results of their research make up the theoretical basis of ongoing scientific investigations. What scientists see, hear, and attend to is influenced by a prior set of ideological beliefs. "Knowledge is socially constructed," according

to Levins and Lewontin, "because our minds are socially constructed and because individual thought only becomes knowledge by a process of being accepted into social currency."[20]

Mechanistic science deals with a very small number of the possible relationships that exist in the world. It attempts to explain observable phenomena in terms of small hidden parts (atoms and molecules) as underlying causes. Dialectical science by contrast does not presuppose a hierarchy of parts and causes. How one divides up the whole depends on the particular problem. Ecology looks at interactions among parts of a community rather than setting up hierarchies among higher and lower forms. A given species such as a migrating bird or caribou may be a part of several different communities at different times.

In a dialectical worldview, objects of natural laws become subjects that may change the apparently constant laws themselves. For example, the origin of life from inanimate matter changed the law which enabled life to originate because living organisms converted the atmosphere from a reducing to an oxygen-rich atmosphere. Mechanistic science separates internal from external causes, holding one constant while changing the other. Thus the environment triggers changes in the organism, as does a living thing as it adapts to environmental change. Or conversely, an internal change initiates development as in the case of an embryo. A dialectical approach looks at the effects of both environment and genetic make up together.

Dialectical science considers change as a tension between opposites. Thus in predator-prey relationships, the process of predation is propelled by the death rate of the prey and the birthrate of the predator, and vice versa. The interaction between the two opposites causes fluctuations in population. As change occurs the initial conditions change. Levins and Lewontin maintain that contradictions in nature are not only political, but ontological, that is, fundamental to being itself. "Opposing forces lie at the basis of the evolving physical and biological world. Things change because of the actions of opposing forces on them, and things are the way they are because of the temporary balance of opposing forces." Rather than change, it is stability and equilibrium that bear explanation. Opposing processes regulate and stabilize an object, as when blood sugar rises in response to sugar ingested or falls with the release of insulin from the pancreas. Similarly, blood pressure is regulated by processes in the kidneys. In each case, opposing forces mutually regulate each other to achieve homeostasis.[21]

CRITIQUES OF SOCIAL ECOLOGY

Social ecology is criticized by deep ecologists for its ponderous and, to some, outdated Marxist theory, for its failure to offer any analysis of a transpersonal or ecological self, and for its lack of any realistic scientific alternatives based on dialectics. To imagine a history or science explained by dialectical processes is not only naive and outdated, but ignores empirical reality in favor of an idealized teleological trajectory. To spiritual ecologists, social and socialist ecologies fail to offer anything beyond the immediate fulfillment of economic and material needs and even denigrate spiritual needs. Despite the contributions of social and socialist ecofeminists (see chapter 8), social ecologies seem to some critics to lack an analysis of socially constructed gender differences or workable proposals for overcoming gender/environment problems.

To some ecophilosophers, both social and socialist ecologists assume an idealized Golden Age absolving early peoples of violence, hierarchy, and competition and imbuing them with an unverifiable egalitarian social harmony and ecological balance not borne out by anthropological or ecological research. Such assumptions impose on history a narrative of decline from an idealized past and set up a hoped for reclamation of lost ideals through a doomed and unrealistic class struggle. Marx, as well as social and socialist ecologists, frame their proposals within a larger narrative of fall and redemption. Joel Kovel argues that there are really two narratives in Bookchin's (and other Marxists') work. In the case of Bookchin, the first narrative is social ecology's public discourse based on the emergence of hierarchy and its dissolution. The second is a retelling of the legend of the Fall and redemption (the master mythos of the Judeo-Christian tradition), in which humanity awaits its redeemer, now called the Anarchist (or Marxist) who suffers persecution and criticism. By preaching the self creativity of nature and freedom from social hierarchy, the Anarchist liberates both nature and humanity.[22]

According to David Watson (alias George Bradford see chapter 4), Bookchin bases his ideas on a progressive vitalism. His underlying assumption is that: "a nature rendered self-conscious means a natural world guided by human rationality toward the balance of harmonious ecological as well as social ends." This kind of evolution has a clear directionality built into it that is not borne out by science and is criticized by scientists who have argued for randomness in evolutionary processes (such as Steven J. Gould in *Wonderful*

Life, 1989). If there is no striving or directionality toward human emergence as self-consciousness, then Bookchin's framework is undercut.[23]

Nor have social ecologists given adequate attention to environmental ethics. They have not shown how a basically homocentric ethic oriented toward social justice can also be sensitively informed by ecological principles. They have not given sufficient credence to an ecocentric ethic that gives moral considerability to nonhuman nature. Multicultural and partnership ethics, however, offer possibilities for combining social ecology's wider goals of social justice and gender equality with ecological processes. Likewise, the contributions of Chaia Heller and Ynestra King to social ecology and of Mary Mellor and Ariel Salleh to socialist ecology deepen their gender analyses (see chapter 8). The debates among these various camps of radical ecologists, however, are important, as they push each other to rethink and reevaluate their own proposals for change.

CONCLUSION

Social ecology emphasizes the human implications of systems of economic production on the environment. Both capitalism and state socialism produce externalities that disrupt nature. Social ecology envisions a world in which basic human needs are fulfilled through an economic restructuring that is environmentally sustainable. While social ecologists would like to see world population stabilize at a level that is compatible with environmental sustainability, they deplore any programs that result in genocide, racism, or callous disregard for human rights in bringing about a demographic slowdown. Instead, economic programs that provide for basic needs, healthcare, security in old age, and employment are the pathways that will bring about a demographic transition in developing countries and equalize the quality of life in both developed and developing countries. Finally, social ecology advocates a science oriented toward social values and the recognition of change, rather than stability, as the basic premise on which to understand the natural world. It is similar to deep ecology in calling for a major transformation in worldviews and a process-oriented science, but differs from it in its emphasis on the human condition, the economic basis of transformation, and a homocentric as opposed to an ecocentric ethic. The ideas of deep, spiritual, and socialist ecologists find expression through the movements discussed in Part III.

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III

MOVEMENTS

7

GREEN POLITICS

The environmental movement of the twenty-first century has arrived at a crossroads. At the intersection, several branches take off in different directions. The avenue on the right is newly paved and its center strip is painted white. Down this highway travel large numbers of established environmental groups, carrying banners that read "Wilderness Forever," "Save the Birds," "Clean up the Oilspill." Known as the Group of Ten, the ranks of these organizations have swelled markedly in response to environmental cutbacks. The road they travel leads to the nation's capital where the heads of each group meet regularly to divide up issues and pledge support for each other's actions. Ensconced in Washington, D.C. headquarters, they vie with other lobbyists for power to influence the executive, legislative, and judicial branches of government. They breakfast with corporate leaders and bankers to work out long term environmental deals and debt for nature swaps.

At the intersection, a branch toward the left is under construction. Still rocky and covered with multi-colored soil, the construction work is being carried out by grassroots environmental justice activists. Concerned that the road pass through clean air and waters and that its workforce be treated fairly, the builders stop frequently to oppose the victimization of peoples of color, toxic landfills, and factory pollutants. At a bend, an obscure trail turns off to the left. Down it move those bent on civil disobedience in defense of nature—Earth First!ers and animal liberationists.

At the center of the crossroads, a wide road is being laid. At its entrance people dressed in green clothing are painting signs reading "We are neither left nor right, we are in front." These Global Greens have formed an international network of Green Parties that communicates with members around the world who reach decisions by consensus. Their work is slow, as they must appeal to many local governments for support for their projects.

Green political groups act to change law and governance. The various movements try to resolve the contradiction between production and reproduction by bringing pressure to bear on specific aspects of social reproduction. While established environmental organizations concentrate their energies on government, pressing for stronger environmental laws, lobbying for specific bills, and challenging existing laws through the courts, grassroots activists work to transform politics itself in new, more truly democratic, environmentally just, and green directions.

Grassroots activists focus on the ways in which daily life is reproduced in neighborhoods and local communities, demonstrating loudly for environmental justice, clean water, air, and healthy food, and against toxic and nuclear threats to biological reproduction. Their strategies include marches, demonstrations, and negotiations at points of production, such as corporation headquarters, incinerator sites, and toxic dumps. Other groups, such as Earth First!ers, Greenpeace activists, and animal liberationists, pinpoint threats to the reproduction of non-human nature (wolves, whales, rainforests, and wilderness), resulting from the production of marketable commodities. Their strategies include confrontations at points of resource extraction, such as lumbering, whaling, fishing, and agribusiness locations.

What are the goals and projects of these builders of roads to the twenty-first century? What are their tactics for changing society? What are their ethical frameworks? Who are their members?

THE GROUP OF TEN

The Big Ten environmental organizations have their origins in the first and second waves of environmentalism. The oldest groups, such as the Sierra Club and the National Audubon Society, originated in the late nineteenth century and made their first national impacts during the progressive conservation movement of the early twentieth century. The progressive movement was

initially an effort to conserve forests, rangelands, and parks for the benefit of middle-class America. Its ethic was homocentric, rooted in Gifford Pinchot's utilitarian maxim of "the greatest good, for the greatest number, for the longest time." John Muir's Sierra Club emphasized wilderness preservation, but its effort to create national parks was supported by the railroads which reaped profits from middle-class tourism, while the Sierra Club itself was divided on such issues as the need for dams for city water supplies versus wilderness recreation (see chapter 3). More recent environmental organizations, such as Friends of the Earth and the Natural Resources Defense Council, are children of the environmental movement of the 1970s and are likewise supported by a middle-class constituency.

The Group of Ten includes the following organizations:

Environmental Defense Fund
Environmental Policy Institute
Friends of the Earth
Izaak Walton League of America
National Audubon Society
National Parks and Conservation Association
National Wildlife Federation
Natural Resources Defense Council
Sierra Club
Wilderness Society

The Big Ten have traditionally focused much of their attention on the legislative process, calling on their constituencies to support particular bills and lobbying efforts, and on the judicial process, challenging legislation and executive decisions that fail to meet high environmental standards. Each organization focuses on particular types of issues, with one taking the lead on a given problem, usually supported by the others. All increased their numbers during the 1980s in response to perceived cutbacks in governmental support for environmental protection. They draw their members and staffs primarily from white, middle-class, educated Americans concerned with issues of wilderness and wildlife preservation in the United States and the Third World. The Sierra Club membership increased from 80,000 to 500,000 during the 1980s, the National Wildlife Federation added 8,000 new members a month, and the Natural Resources Defense Council doubled its numbers between 1985 and 1989.[1]

Big Ten budgets, which grew from a combined $10 million in 1965, to $218 million in 1985, and $514 million in 1990, receive substantial contributions from corporations, utilize a top-down management structure, and their boards include corporate executives. The NWF budget grew from $63 million in 1988 to $96 million in 1994, and its sleek Washington, D.C. headquarters cost $40 million. Its donors included Bristol Myers-Squibb, Ciba-Geigy, DuPont, and Pennzoil. The WWF grew from $17 million in 1985 to $62 million in 1993, bolstered by contributions from Bank of America, Eastman Kodak, J.P. Morgan, and Philip Morris. The National Audubon Society's list of corporate donors included Bechtel, AT&T, Citibank, Honda, Martin Marietta, Dow, and Scott Paper. Wheelabrator, a supplier of incinerator technology opposed by environmentalists, contributed to Audubon's new headquarters in New York. Foundations also help to promote agendas through large contributions, but are themselves heavily vested in companies considered environmentally questionable. The Rockefeller Foundation invests in oil and gas development; Pew Charitable Trusts in oil, timber, mining, and chemical companies, while the Alton Jones Foundation invests in Maxxam and Louisiana Pacific lumber companies and in gold mining.[2]

Big Ten action strategies are designed to retain the support of their wealthy contributors. The National Audubon Society sends out glossy catalogues of consumer bird-watching items designed to appeal to wealthy donors. The NWF added a Corporate Conservation Council in 1982 dedicated to economic progress through resource conservation. The head of Waste Management Inc., now WMX, (charged with numerous environmental violations), became an NWF board member.

According to former Environmental Protection Agency chief, William Ruckelshaus, "the strongest supporters of a forceful EPA are the industries it regulates. They want government to set reasonable standards and they want the public to know they are being enforced."[3]

During the late twentieth century, mainstream environmentalism moved further from grassroots confrontation and closer to corporate cooperation. The growing sense that the Big Ten were intimately connected with reform environmentalism led to disenchantment among those who wanted to use direct action to assert the rights of women and minorities, to protest corporate pollution, and to save wilderness and endangered species. These groups, from housewives confronting neighborhood waste spills and minorities protest-

ing community incinerators to Greenpeace sailors saving whales and Earth First!ers sitting in redwoods, used marches and demonstrations, camp-ins and sit-ins, petition drives, civil disobedience, and street theater to publicize their issues.

THE ANTI-TOXICS MOVEMENT

During the 1980s, grassroots activists took on local, hometown, backyard issues. Deeply skeptical of the assurances of government, industry, and mainstream environmentalism, much of the populist movement has centered on issues of human health—toxic chemicals in water, air, and soil to rising cancer rates and reproductive harm. The ethic of anti-toxic coalitions is homocentric, but there is a recognition that what is healthy for humans is also healthy for other species and the environment as a whole. Many of the most vociferous proponents are women (see chapter 8). Love Canal activist Lois Gibbs's Citizen's Clearing House for Hazardous Waste began recording the uprising against toxics in 1983 through its newsletter, *Everyone's Backyard*. Annual grassroots conventions, held since 1986, link local campaigns by bringing out issues of social justice. The National Toxics Campaign, which began publishing *Toxic Times* in 1988, brought together activists and their movements around the world.

At present, over 200,000 hazardous waste sites exist in the United States and the list continues to grow. Cleaning them up under the Superfund Law is only one part of a program to deal with the effects of toxic chemicals. A toxics prevention campaign is also essential to curtail the production of dangerous chemicals when safer alternatives exist. State legislative and initiative campaigns and a national policy on hazardous wastes sponsored by activists are a high priority.

The anti-toxics movement opposes toxic waste incinerators that, if constructed as proposed, could release millions of pounds of chemicals into the atmosphere, creating "local sacrifice zones." The cure makes the illness worse. Incineration of wastes increases acid-rain forming gases and toxic ashes. The resulting carbon dioxide contributes to global warming, while chlorinated chemicals add to ozone depletion. Incinerators, contend the anti-toxics activists, violate the Resource Conservation and Recovery Act which mandates waste reduction as the strategy for controlling waste.[4]

Instead, waste production should be reduced at the source by the industries themselves. This entails: (1) reducing and eliminating waste output, (2) recycling, reusing, and exchanging waste that cannot by eliminated, (3) ceasing production of unneeded products that contribute to waste, (4) treating and destroying nonrecyclable waste at the production site rather than releasing it into the environment.

To protect people victimized by toxics, the National Toxics Campaign advocates a Bill of Citizens' Rights, including:

- The right to be safe from harmful exposure
- The right to know
- The right to cleanup
- The right to participate
- The right to compensation
- The right to prevention
- The right to protection and enforcement

The grassroots movement against toxics advises local groups to plan a clear strategy for action by asking the questions: What do we want? Who can give it to us? How do we make them do it? The 1986 federal Community Right to Know law allows citizens to obtain information on chemical emissions affecting their neighborhoods. They can then work with local industries to clean up chemical waste production. Groups should organize so as to include all people directly affected, not just property owners. They should promote participation and unity among all ethnic groups which have a stake in the outcome.[5]

ENVIRONMENTAL JUSTICE

November 12, 1988. A multi-racial crowd of one thousand women and men marches down a street in East Los Angeles. Chanting and waving banners proclaiming, "El Pueblo Parará el incinerador" ("The People Will Stop the Incinerator,") and "Pueblo que lucha, triunfa!" ("People who struggle, win!"), they arrive at the site of a proposed toxic waste incinerator. Sixty-year-old Aurora Castillo of Mothers of East Los Angeles (MELA) seizes the microphone. "They thought the people were a sleeping giant. We're not

sleeping anymore." Assemblywoman Lucille Roybal-Allard follows, "They think that if they pick a poor community, they won't have any resistance. We are here to prove they are wrong."[6]

The two women are members of a minority-led coalition that successfully brought together neighborhood, environmental, and radical activists to defeat a Los Angeles plan to construct a waste incinerator in an inner city neighborhood. With the support of minority lawmakers and grassroots volunteers, the neighborhood built a coalition that tapped local opposition, while middle-class environmental and slow-growth groups supplied expertise and labor. Although mainstream environmental groups held back, Greenpeace sent people to help organize the campaign and experts to testify before the city council.[7]

Environmental justice campaigns in urban environments increasingly respond to issues facing people of color and low income residents. The movement took off in 1982 when a Warren County, North Carolina neighborhood that was 60 percent African American and 4 percent Native American staged an unsuccessful uprising against a proposed PCB (polychlorinated biphenyls) disposal site. The protest originated from a state decision to locate a landfill in Warren County in order to clean up PCBs illegally dumped by a local contractor along roadways in thirteen North Carolina counties. When the county protested the decision to no avail, the citizens organized. Together white landowners, black residents, and civil rights organizers disrupted the trucks for six weeks in the fall of 1982, resulting in some 500 arrests, and garnering considerable media attention. They argued that the county was chosen because it was poor, unempowered, and largely African American. The protest resulted when white members of Warren County Citizens Concerned about PCBs reached out to a black Baptist pastor and together the groups made contact with the United Church of Christ's Commission on Racial Justice, including civil rights organizers Leon White and Ben Chavis. Chavis, who had North Carolina roots and a national reputation, participated in the protest, gave an inspiring speech, and was among those arrested. The protests drew African Americans into the anti-toxics movement and propelled Chavis to the forefront of the movement he named "environmental racism."[8]

Under Chavis' urging the United Church of Christ undertook a study of the connections between toxic chemicals and race and in 1987 issued a now well-known report entitled, "Toxic Wastes and Race in the United States."

The report showed that "communities with the greatest number of commercial hazardous waste facilities had the highest composition of racial and ethnic residents." Fifty-eight percent of the country's blacks and 53 percent of its Hispanics lived in communities (such as Emelle, Alabama; Houston, Texas; and Chicago's south side) where hazardous waste dumping was uncontrolled.[9]

Inner city air and soil are contaminated with lead from chipping house paint and auto emissions. A 1988 study conducted by the federal Agency for Toxic Substances and Disease Registry showed that black children were four times as likely to encounter lead poisoning as white children. In 1990, Robert Bullard's book, *Dumping in Dixie*, argued that people of color are disproportionately harmed by environmental hazards.[10]

In 1989, a Citizens for a Better Environment study of Richmond California documented 350 industries that used hazardous chemicals and 210 toxic chemicals that were released into neighborhoods where African American and Hispanic populations are concentrated. Fourteen hundred people assembled at the North Richmond Baptist Church in April of 1990 to hear black presidential candidate Jesse Jackson campaign for cleaner air for inner city people. "In Selma," Jackson proclaimed, "we marched for the right to vote. This morning we are gathering for the right to breathe." Jackson's message urged the churchgoers to become stewards of the earth and to negotiate with the polluters for a better environment.[11]

Native American tribes have been offered large sums of money for allowing their lands to be used as toxic waste dumps. The Environmental Protection Agency has held back on providing help and financial assistance to native peoples. Native groups have therefore created their own movements to preserve their rights. To combat radioactive and toxic waste dumping on Native American lands, Jessie DeerInWater founded Native Americans for a Clean Environment (NACE) in 1984. Alarmed by her discovery that Sequoyah Fuels planned to inject radioactive waste into a fault line in Vian Oklahoma, she alerted her Cherokee sisters and brothers. NACE then went on to fight the conversion of radioactive and toxic waste into fertilizer, or raffinate, implicated in the discovery of a nine-legged frog where the fertilizer was applied.[12]

In October 1991, widespread recognition of environmental racism led to the First National People of Color Environmental Leadership Summit in

Washington, D. C., attended by over one thousand participants. The Summit adopted the Principles of Environmental Justice (see Table 7.1). The first stated: "Environmental Justice affirms the sacredness of Mother Earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction." In 1994, President Bill Clinton issued Executive Order 12898 ordering that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…." The second Environmental Justice Summit, held in Washington, D.C. in October, 2002, expanded the environmental and economic justice paradigm to include international and globalization issues, including global poverty, environmental pollution, and human health. The success of the conference was attributed to the organizing skills of women of color, in particular to chair Beverly Wright of the Deep South Center for Environmental Justice.[13]

Such actions and statistics underscore the need for the Group of Ten and minority groups to come together on environmental justice issues. Black activist Cora Tucker, founder of Citizens for a Better America, described the differences in priorities:

> The environmental issues are cut in such a way that Blacks and Hispanics don't feel like it's their issues. The traditional environmental groups talk about how we got to do something about saving the yellow-bellied sapsucker. Black people are more interested in saving their children that they see dying in their arms (from toxic wastes). It's hard for white folk to understand that we care about the environment.[14]

Carl Anthony, a black architect and co-founder of Earth Island Institute's Urban Habitat Program, observes that the environmental movement:

> has tended to be racially exclusive, expressing the point of view of the middle- and upper-middle income strata of European ethnic groups in developed countries. It has reproduced within itself prevailing patterns of social relations. Until recently, there has been little concern for the environmental needs and rights of historically disadvantaged groups in developed countries.…Can we ignore the underclass trapped in American ghettos while claiming to speak for reconciliation of economic growth with environmental integrity? If we are to restore the cities, we must invest in the future of the people who live there.

Table 7.1

Principles of Environmental Justice

WE, THE PEOPLE OF COLOR, gathered together at this multinational People of Color Environmental Leadership Summit to begin to build a national and international movement of all peoples of color to fight the destruction and taking of our lands and communities, do hereby re-establish our spiritual interdependence to the sacredness of our Mother Earth; to respect and celebrate each of our cultures, languages and beliefs about the natural world and our roles in healing ourselves; to insure environmental justice; to promote economic alternatives which would contribute to the development of environmentally safe livelihoods; and, to secure our political, economic and cultural liberation that has been denied for over 500 years of colonization and oppression, resulting in the poisoning of our communities and land and the genocide of our peoples, do affirm and adopt these Principles of Environmental Justice:

1. Environmental justice affirms the sacredness of Mother Earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction.
2. Environmental justice demands that public policy be based on mutual respect and justice for all peoples, free from any form of discrimination or bias.
3. Environmental justice mandates the right to ethical, balanced and responsible uses of land and renewable resources in the interest of a sustainable planet for humans and other living things.
4. Environmental justice calls for universal protection from nuclear testing, extraction, production and disposal of toxic/hazardous wastes and poisons and nuclear testing that threaten the fundamental right to clean air, land, water, and food.
5. Environmental justice affirms the fundamental right to political, economic, cultural, and environmental self-determination of all peoples.
6. Environmental justice demands the cessation of the production of all toxins, hazardous wastes, and radioactive materials, and that all past and current producers be held strictly accountable to the people for detoxification and containment at the point of production.
7. Environmental justice demands the right to participate as equal partners at every level of decision making including needs assessment, planning, implementation, enforcement and evaluation.
8. Environmental justice affirms the right of all workers to a safe and healthy work environment, without being forced to choose between an unsafe livelihood and unemployment. It also affirms the right of those who work at home to be free from environmental hazards.
9. Environmental justice protects the right of all victims of environmental injustice to receive full compensation and reparations for damages as well as quality health care.
10. Environmental justice considers governmental acts of environmental injustice a violation of international law, the Universal Declaration On Human Rights, and the United Nations Convention on Genocide.
11. Environmental justice must recognize a special legal and natural relationship of Native Peoples to the U.S. government through treaties, agreements, compacts, and covenants affirming sovereignty and self-determination.
12. Environmental justice affirms the need for urban and rural ecological policies to clean up and rebuild our cities and rural areas in balance with nature, honoring the cultural integrity of all of our communities, and providing fair access for all to the full range of resources.
13. Environmental justice calls for the strict enforcement of principles of informed consent, and a halt to the testing of experimental reproductive and medical procedures and vaccinations on people of color.
14. Environmental justice opposes the destructive operations of multinational corporations.

15. Environmental justice opposes military occupation, repression and exploitation of lands, peoples and cultures, and other life forms.
16. Environmental justice calls for the education of present and future generations which emphasizes social and environmental issues, based on our experience and an appreciation of our diverse cultural perspectives.
17. Environmental justice requires that we, as individuals, make personal and consumer choices to consume as little of Mother Earth's resources and to produce as little waste as possible; and make the conscious decision to challenge and re-prioritize our lifestyles to insure the health of the natural world for present and future generations.

Adopted: October 27, 1991
The First People of Color Environmental Leadership Summit
Washington Court on Capitol Hill, Washington, D.C., October 24–27, 1991.

Anthony suggests that environmentalists and inner city organizations can work together on restoration projects that promote tree planting, horticulture, urban farming, wilderness outings, and environmental education for minorities, as well as building coalitions that address issues such as toxic waste dumping.[15]

Despite the new activism of minorities, the green movement is largely white. The Southern Organizing Committee for Racial Justice and the United Church of Christ's Commission for Racial Justice faulted the Group of Ten for racism in hiring. None of the groups had minority directors or managers and their staffs have less than 1 percent minority representation. The national environmental groups admit that minority involvement must be increased, but also cite low salaries as a deterrent to hiring minorities. The Audubon Society expressed concern that "not one major environmental or conservation organization can boast of significant Black, Hispanic, or Native American membership." A Sierra Club spokesperson stated that "the ethnic diversity of public policy is going to increase during the next century. If the environmental community does not mirror that change, our…ability to influence public policy makers will deteriorate." But more pragmatically, mainstream environmentalists fear that their credibility on positions that affect the Third World is compromised by their largely white middle-class North American base. Since the early 1990s, environmental organizations have moved to address these complaints. But the Southern Organizing Committee for Racial Justice has nevertheless faulted the Sierra Club for racism in calls by some of its members to address U.S. population growth by curtailing immigration. Gaps between inner city survival issues and saving the

Antarctic wilderness are perhaps still too wide to be bridged effectively in the immediate future.[16]

THE GREENS

At the international level, green politics has become a major force for ecological change. Australia's United Tasmanian Group, formed in 1972, and New Zealand's Values Party, formed a few months later, were the first political parties with green platforms to challenge established parliamentary systems. The West German Greens (*die Grünen*) emerged in the early 1980s from a mass movement that used direct action to confront local community issues. They drew on people who had participated in such "basis" movements as the anti-nuclear, ecology, women's, peace, urban squatters, gay rights, Third World solidarity, and youth movements. They burst onto the international scene in 1983 when they won enough votes (5.6 percent) to be seated in the West German National Assembly (the *Bundestag*). In the elections following the German reunification of 1990, the West German Greens lost their representation, but the East Germans gained eight seats.

The political platform of the Greens is based on four pillars: (1) Grassroots Democracy, (2) Social Justice, and Equal Opportunity, (3) Ecological Wisdom, and (4) Nonviolence. Along with the four pillars, six additional principles comprise the Ten Key Values: (5) Decentralization, (6) Community-based Economics and Economic Justice, (7) Feminism and Gender Equality, (8) Respect for Diversity, (9) Personal and Global Responsibility, and (10) Future Focus and Sustainability.[17]

Greens are divided between party and movement politics. With West German parliamentary representation a division appeared between the *realos*, who held the majority of seats and adapted to the pragmatics of the parliamentary framework, and the *fundis*, who held to the original values and formed the majority in the collective movement. In a 1988 manifesto, the *realos* stated that "the ecological threat to industrial society can be turned around only in the framework of the existing system." In an effort to appeal to the "enlightened" middle class, they called on multinational corporations to adopt environmental standards. They opted for working with the state to solve environmental problems and advocated entering into coalitions with other parties. The *realos* were opposed by the movement approach of the *fun-*

dis, who included left Greens, eco-socialists, and radical feminists. In 1993, the East and West German Greens merged and in 1998 and 2002 formed a coalition with the Social Democrats, the traditional labor party.[18]

Similar divisions between party and movement politics appeared in other European Green parties. The Italian Greens (*i Verdi*), founded in Florence in 1984 from local groups of anti-nuclear, ecology, citizen, and religious activists, decided two years later to present party backed Green Lists for local, regional, provincial, and national elections. The parliamentary *Verdi* hold that party representation allows greater access to resources and to the centers of decision making. The French Greens (*les Verts*) began as the Ecologist Party in the early 1980s and in 1989 won 1800 local seats. The party became part of the governing coalition in 1997. In a country that depends on nuclear power for most of its energy needs, the French Greens are notable for their anti-nuclear and pro-environmental positions.[19]

In Sweden the Green Party (*Miljöpartiet de gröna*), formed in 1981, won numerous local offices and achieved national parliamentary representation in the elections of 1988, sustained into 2002. The party promotes a balance with nature through self-sufficient organic agriculture, abolition of nuclear power, development of alternative energy sources, decentralization of living and working environments, reduction of dependence on automobiles through increased public transit, and the manufacture of products that satisfy basic human needs. The party's constitution requires that a minimum of 40 percent of each sex be represented on each of its three central committees. It also has some thirty issue-oriented committees. Women have been most active on those concerned with peace, housing, schools, children, medical care, agriculture, and culture. Men have been dominant on those that deal with the economy, energy, science, labor, and international issues. The other committees have had a more even gender division.[20]

With the collapse of the Soviet Union in 1989, the reunification of Germany, the rising importance of the European Union (founded in 1957), and the creation of the European Parliament, the political terrain in Europe has undergone numerous political reorientations. In 2004, the federated green parties of Europe united forces to form the European Green Party to improve their thirty-six seat standing in the European Parliament. Thirty-two green parties from twenty-nine countries in Europe, Eastern Europe, and Russia met in Rome (where the European Union was founded) to forge common

ground for moving toward sustainability. Among its goals were to phase out nuclear power, ban genetically modified organisms (GMOs) in foods, to confront top-down globalization, and to democratize citizen rights. At the same time, the Young Greens of Europe also reaffirmed its commitment to support a Green platform and to find methods of attracting teens to the Green movement to fuel it from below as aging Greens, who developed their commitments two to three decades ago, are now sitting in parliaments. The Youth Greens encourage youth candidates for local offices and encourage young people to become activists for the environment and democracy.[21]

NORTH AMERICAN GREENS

In Canada, Green parties were formed in 1983 and have been active in British Columbia, Ontario, and Nova Scotia. According to the Green Web of Nova Scotia, a division exists between movement and party people. The issues are the accountability of those involved in politics and control by the grassroots constituents. "Much of the best environmental work that is being done in Canada," states Green Web, "is being done by groups who are completely independent of the green parties that exist." Party Greens respond that people have a choice as to whether they want to join environmental groups or work within the party. However, "working with the Green Party means that you are committed to a broader vision of social change than strictly environmental issues as with pressure groups."[22]

In the United States, the Greens were originally coordinated through the United States Green Committees of Correspondence that emerged from a founding meeting in Minnesota in 1984. In 1987 they developed the Strategy and Policy Approaches in Key Areas process, known as SPAKA. Then in 1989, some two hundred green groups throughout the United States, representing hundreds of people submitted position papers that were discussed and incorporated into a Green Program USA at a nationwide meeting in Eugene, Oregon. The delegates attempted to reach consensus on each position paper. When consensus was not achieved, suggestions and blocking statements were submitted. The Program Text was then returned to local groups and the membership at large for discussion and refinement. Women constituted about half of the Eugene gathering and held key positions, but equity was still a goal rather than a reality.[23]

In 1991, the Green Committees of Correspondence formed a new group called The Greens/Green Party USA. The program included points of view on such topics as social justice, peace and nonviolence, politics, general economics, water, forests, food and agriculture, native Americans/indigenous peoples, animal liberation, life forms, eco-philosophy, ecofeminism, and green spirituality. On each topic, the program included philosophical principles as well as specific recommendations for actions. It favored structural changes to "promote economic democracy in production, distribution and consumption under the control of an informed and empowered public, constrained by the principle of sustainability and committed to the integrity of the Earth and its regenerative powers." Focusing on waste as a problem of production rather than disposal, it argued for a sustainable, closed loop resource economy in which the by-product of one system becomes the input and source-material for another. It promoted energy conservation and efficiency with the goal of making local communities energy self-sufficient. It called for an ecologically-based sustainable agriculture that would promote regional self-reliance and put an end to factory farming and capital-intensive, highly-mechanized chemical agriculture.[24]

At the other end of the spectrum, an emerging Left Green Network held a 1989 organizing conference that embraced principles such as anti-capitalism, social ecology, and women's, gay, and lesbian liberation. The network called for an independent radical politics outside the Democratic and Republican parties and promoted an ecologically-oriented cooperative commonwealth based on decentralized, democratic, public-ownership of property and guaranteed housing, healthcare, and employment.[25]

Working at the grassroots level, Greens supported candidates in local elections. Green activists won elections in 1989 to city councils in such towns as Gloucester, Holyoke, and Cambridge, Massachusetts, Ithaca, New York, and Chapel Hill, North Carolina. In Alaska, a Green candidate won the election for mayor in the town of Cordova. In California, Greens served on local city councils, water boards, and planning commissions.

By 1992, state Green parties were organized in several states nationwide and in 1996 held their first national nominating convention in Los Angeles. Ralph Nader became the Green Party's first presidential campaign nominee, entering the California Green Primary. In November 1996, Nader was on twenty-two ballots nationwide and another twenty-three states qualified

him as a write-in candidate. His vice-presidential running mate was Native American activist Winona LaDuke. Nader came in fourth in the national election (behind Bill Clinton, Bob Dole, and Ross Perot) gaining 700,000 votes nationwide. Nevertheless, the Nader candidacy was controversial among Greens, many of whom held that organizing from the ground up was the way to build a truly democratic movement and that state and national politics and parties undercut consensus building and participatory politics. Other Greens felt marginalized by the candidacy of a "straight white-male presidential candidate."[26]

In June 2000, the "Green Party of the United States" held a National Nominating Convention in Denver, Colorado, adopted a Green Party Platform, and again ran the Nader/LaDuke ticket in the 2000 presidential election. Nader's acceptance speech and subsequent campaign speeches garnered widespread support among Greens, independents, and disenchanted party dissidents. But when Florida's electoral votes were challenged in the courts and the election went to George W. Bush, Nader was regarded by many people across the nation as a spoiler whose votes had deprived Al Gore of the presidency pushing the nation more deeply in an anti-environmental direction. Nader again ran for the presidency in 2004, but as an independent with limited Green Party endorsement.[27]

GLOBAL GREENS

A major effort to coordinate Greens worldwide began in Rio de Janeiro, Brazil in 1992 at the Earth Summit. In 2001, in Canberra, Australia, Greens approved the Charter of the Global Greens. Federations of Green Parties exist on every inhabited continent and are allied through the internet. The Federation of Green Parties of Africa, of the Americas, of Asia-Pacific, and of Europe are united as "citizens of the planet" in the "awareness that we depend on the Earth's vitality, diversity and beauty, and that it is our responsibility to pass them on, undiminished or even improved, to the next generation." Global Greens have issued proclamations on major policies such as the Kyoto Climate Change Convention of 1997 in which they state: "Humanity stands on the threshold of fundamentally destabilizing the climate it has known throughout recorded history.…No longer does any serious question exist as to whether humans are altering the climate. Only how."[28]

Greens, nevertheless, are divided in their theoretical and ethical allegiances. Many espouse deep ecology and an ecocentric ethic, which views humans and other species as integral parts of the ecological whole, as the rational foundation for their politics. A strong contingent is motivated by the need for humans to reclaim deep spiritual connections to nature and uses ritual at Green gatherings as a mode of energizing people for action (see chapters 4 and 5). Left Greens, on the other hand, are informed by social ecology's homocentric ethic of justice for all people. This homocentric ethic, however, is not the utilitarian ethic of the Progressive conservation era, but one that is enriched by an understanding of the place of humans in the interconnected ecological world and the prior history of human domination of other peoples and nonhuman nature (see chapter 6).

EARTH FIRST!

Bonnie and Doc

> parked the car out of sight of the highway, on a turnoff, and walked the half mile back to their objective. The usual precautions. As usual he carried the chain saw, she led the way (she had better night vision). They stumbled through the dark, using no other light than that of the stars, following the right of way fence.…They came to the target. It looked the same as before.
>
> MOUNTAIN VIEW RANCHETTE ESTATES
> TOMORROW'S NEW WAY OF LIVING TODAY!
> Horizon Land & Development Corp.
>
> "Beautiful," she said, leaning against the panting Doc.
>
> "Beautiful," he agreed. After resting a moment he put down his McCulloch, knelt, turned on the switch, set the choke, grasped the throttle and gave a good pull on the starter cord. The snappy little motor buzzed into life; the wicked chain danced forward in its groove. He stood up, the machine vibrating in his hands, eager for destruction. He pushed the oiler button, revved the engine and stepped to the nearest upright post of the billboard.

So begins an undercover action of two eco-raiders, immortalized in Edward Abbey's novel, *The Monkeywrench Gang* (1975).[29]

Inspired by Abbey, and founded by disenchanted environmentalist Dave Foreman in the early 1980s, Earth First! advocates strategic ecotage. Its bible is *Ecodefence: A Field Guide to Monkeywrenching* and its medium of communication is *Earth First!: The Radical Environmental Journal*, which proclaims "no

compromise in defense of Mother Earth." Although in 1990 they divided into two factions with two separate journals, Earth First!ers are not an organized movement in a formal sense. Rather they are a loose association of "earth warriors" dedicated to saving wilderness, through sabotaging the machines that destroy it. They are furious at the failure of the Forest Service and the Bureau of Land Management (BLM) to set aside America's last heritage of wilderness and at bureaucratic environmentalism for lack of aggressive action. Its methods are demonstrations, guerrilla theater, civil disobedience, and monkeywrenching. Many in the movement consider themselves anarchists and all deny that they have been responsible for any injuries to human beings.

To Earth First! the results of the Forest Service's 1977-78 RARE II (Roadless Area Review and Evaluation) survey were scandalous. Out of eighty million acres of National forests with a total area equivalent to the size of New Mexico, only fifteen million acres—too high, dry, cold, or steep for logging—were slated for protection. Old-growth forests in the northwest were fingered for logging. A subsequent study DARN (Development Activities in Roadless Non-selected) recommended construction of nine thousand miles of logging roads. The BLM survey identified sixty million acres or an area about the size of Oregon. Of these, only about nine million acres will probably be recommended for wilderness status.

Ecodefense calls on women and men to act individually and in small groups to defend the wild. "Strategic monkeywrenching. . . can be effective in stopping timber cutting, road building, overgrazing, oil and gas exploration, mining, dam building, powerline construction, off-road-vehicle use, trapping, ski area development, and other forms of destruction of the wilderness.…But it must be strategic, it must be thoughtful, it must be deliberate in order to succeed." The manual stresses that monkeywrenching is non-violent and should not be directed at human beings or other living things. "It is aimed at inanimate machines and tools." Monkeywrenching should not be used when other forms of non-violent confrontation are in progress such as blockades or other forms of direct-action civil-disobedience since it could result in backlash against the protesters or undercut delicate negotiations.[30]

Earth First! direct actions have included blockades of logging roads, tree-sits in old-growth forests, demonstrations outside of U.S. Forest Service offices, lumber company sit-ins, and protests over the Smithsonian Institute's proposal to place an observatory in Arizona threatening the habitat of the

Mount Graham red squirrel. In more notable non-violent actions Earth First!ers have padlocked themselves to bulldozers, locked themselves to the cranes of log export ships to support U.S. millworkers, entered their own grazing protest floats in ranchers' livestock parades, and scaled coliseum walls with protest banners.[31]

Earth First! publishes a journal, Earth First!: the radical environmental journal, that reports on direct actions taken in defense of Mother Earth and holds an annual "tribal gathering," the "Round River Rendezvous" in various locales in the country. The gatherings help members to develop activist networks and to plan local actions. Anonymous actions by Earth First!ers and by the Earth Liberation Front (ELF) have included organizing tree sits in the red oaks of the Northeast and in the Headwaters' Forest in California to protest logging of ancient forests, confronting contour coalmining companies in the Cumberland mountains of Tennessee, and burning SUVs in dealer lots in Oregon.[32]

But the Earth First! philosophy went beyond simple direct actions in defense of wilderness. For Foreman, it was essential that people maintain their evolutionary ties to the wild. "I am a product of the Pleistocence epoch, the age of large mammals," he wrote. "I do not want to live in a world without jaguars and great blue whales and redwoods and rain forests, because this is my geological era, this is my family, this is my context. I only have meaning *in situ*, in the age I live in, the late Pleistocene." Accordingly, the *Earth First!* journal devoted much attention to issues such as old-growth forests, tropical rainforest deforestation, bear and wolf habitat, and endangered species.[33]

But Foreman also embraced deep ecology as a philosophy of nature and a Malthusian view of population. (Earth First! printed bumper stickers that said "Malthus was Right!") Not all Earth First!ers would agree with this position, nor would all deep ecologists. Yet in the Earth First! journal, in 1987, columnist Miss Ann Thropy (a fictitious stand-in attributed to Foreman) wrote, "I take it as axiomatic that the only real hope for the continuation of diverse ecosystems on this planet is an enormous decline in human population…. [I]f the AIDS epidemic didn't exist, radical environmentalists would have to invent one." In 1990, Dave Foreman apologized for this statement calling it an insensitive remark.[34]

Foreman was also quoted on Ethiopia as stating that "the best thing would be to just let nature seek its own balance, to let the people there just

starve." On Latin American immigration, he argued, "Letting the USA be an overflow valve for problems in Latin America is not solving a thing. It's just putting more pressure on the resources we have in the USA…and it isn't helping the problems in Latin America." Such views were attacked by social ecologists Murray Bookchin and George Bradford for being racist and élitist.[35]

A reconciliation between social ecologists and Earth First!ers was initiated in a 1989 debate that included Bookchin and Foreman and a subsequent book by the two protagonists. Bookchin declared solidarity with Earth First!, emphasizing his own love of wilderness. Marxism, he argued, does not go far enough in questioning the domination of nature by humans. Yet a feeling of compassion for other human beings is also necessary if we are to express our feelings of compassion for nature. Foreman cited multinational greed as a root cause of social injustice. Seeing the earth as a natural resource to be exploited for profits leads to seeing humans in the same way.[36]

In 1990 Earth First! underwent a schism between wilderness (biocentrism) and social justice (humanism) activism. A new emphasis on social justice and urban anarchism represented most visibly by Judi Bari and Mike Roselle produced a division within the movement. Pacific Lumber Company, a company town in Northern California, had been bought out by Maxxam Corporation and the new owners were paying off their junk bonds by selling off capital, namely old growth redwoods. Bari's concerns were for both the redwoods and the jobs of the timber workers and she used feminist and ecofeminist tactics and rhetoric. In the 1990 "Redwood Summer" of activism to save California's ancient forests, hundreds of volunteers engaged in tree-sits and road-blocking and underwent nonviolent training organized by affinity groups, rejecting tree spiking and macho tactics. Bari and activist Daryl Cherney were injured when a pipe bomb in a vehicle they were driving exploded and, despite their nonviolent credo and a letter from "the Lord's Avenger" claiming responsibility, the FBI charged the two Earth First!ers with constructing the bomb themselves. Dave Foreman was also under investigation by the FBI as a co-conspirator for Earth First! actions in an attempt to cut down power lines in the Southwest and, in opposition to the retreat from biocentrism, he and others resigned from Earth First!. The Earth First! journal continued under new editorship, but Foreman's faction later founded a new journal *Wild Earth* that continued to emphasize wilderness preserva-

tion, ecological integrity, biodiversity, and a biocentric approach to ethics. Redwood Summer along other follow-up actions (some marked by police violence, the use of pepper spray, and the death of a protester) eventually resulted in setting aside many of the old-growth redwoods in the Headwaters Forest in Northern California, although threats to the largest trees continue.[37]

GREENPEACE

Using direct action and confrontation as strategies for change, the international environmental organization, Greenpeace, has taken on a variety of issues, from promoting nuclear-free seas, to saving whales and seals, to protesting the waste trade and toxics, and saving Antarctica. It originated when the Vancouver-based "Don't Make a Wave" Committee, which protested the possibilities of tidal waves generated from Pacific nuclear tests in 1969, became the organization Greenpeace in 1971. It used the Quaker tradition of bearing personal witness to atrocities, such as sailing into Pacific nuclear test areas, expanding the strategy to global witnessing through the mass media.

Greenpeace started its "save the whales" campaign in 1973 when a New Zealand biologist working in Vancouver liberated a killer whale from an aquarium, and activists began to advocate whale sanctuaries and to find ways to bear witness to whale slaughter. In 1975 volunteers in a rubber boat confronted Soviet whaling harpooners, capturing the event on film. After that moment of international recognition, it confronted whaling countries through the International Whaling Commission and organized boycotts and grassroots rallies. After ten years of protest only three countries, Japan, Iceland, and Norway continued to harvest whales. Action against these holdouts continued and against the Whaling Commission's relaxation of whaling bans and quotas.

Subsequent Greenpeace campaigns against seal hunting, joined by animal liberation movements, sharply curtailed the international trade in fur, but also drew criticism from seal hunters who pointed out that their original subsistence economies, which captured seals only out of need, were converted to the fur trade by the same western forces now again depriving them of their livelihoods. The Greenpeace campaign for dolphin-safe tuna, caught by lines rather than miles of plastic nondegradable driftnets that trap dolphins and other nontarget species, was supported by San Francisco's Earth Island

Institute. In response to such concerns, expressed worldwide, the United Nations issued a ban on driftnet fishing effective in 1993.

In the Pacific, after taking on the issue of nuclear-free seas, international attention was gained when the French sunk a protesting Greenpeace vessel, the "Rainbow Warrior," in 1985 in New Zealand. Greenpeace continued to block and tag naval vessels carrying nuclear weapons and reported them through newspapers such as the New York Times. As a result, dozens of ports and nations banned ships carrying such weapons. Greenpeace activists also exposed ships carrying toxic wastes destined for dumps in Third World countries such as Guyana, Guinea, Honduras, the Bahamas, Panama, and Tonga. Seventy-eight countries subsequently banned waste imports. In Antarctica, Greenpeace monitored trash, diesel fuel, and human waste that research stations dumped into the ocean and promoted the idea of a World Park instead.[38]

From its earliest work on whales, seals, and oceans, Greenpeace has expanded its purview to include protesting the destruction of ancient forests, banning factory trawlers, fighting fossil fuels that contribute to global warming, stopping nuclear power and the transport of plutonium, and halting the release of genetically modified organisms (GMOs) into the environment. It works toward implementing sustainable forestry, organic agriculture, renewable forms of energy, protecting marine life, and promoting a change to clean, non-toxic forms of production.[39]

Greenpeace actions have thus attacked specific forms of industrial production that threaten the reproduction of life through its fights to save whales, dolphins and seals, and through its campaigns against nuclear weapons and toxic dumping. Its efforts have therefore focused on resolving the contradiction between production and reproduction. Its ethic is fundamentally biocentric—individual life forms, especially those valued by humans and saved through human witnessing, are sacred.

DIRECT ACTION

The "Day After Earth Day," dawns foggy and cool. At 5: 00 a.m. sleepy activists, still tired from the activities of Earthday 1990, roll over and struggle out of sleeping bags strewn on friends' floors and porches. Gulping down coffee and a little cereal, they carry bicycles, some adorned with hobby-horse heads,

down steep San Francisco row house steps, and coast down deserted streets toward the city's hub. They arrive at Pine and Sansome to find an assortment of colorfully dressed bears, birds, and flowers gathering outside the doors of the Pacific Stock Exchange. Posters proclaiming "Liberate the Earth," and "Reforest Corporate Wastelands;" drums, rattles, and megaphones; pots containing dead trees; and chants of "Earth First, Profits Last" announce the sentiments of the demonstrators. On hand, also, are news reporters, with television cameras and camcorders, police officers, and curious onlookers.

As the first suited businessmen and spike-healed businesswomen arrive, the crowd begins to chant, "Earth first, shut it down," and "Don't go to work." The police form a tight semicircle to hold back the nearest demonstrators and escort the stockbrokers toward the entrance. A group of six protesters pushes its way to the door and forms a line across it. They link arms and stand stoically as police arrest them one by one, tie their wrists with plastic handcuffs, and move them toward the waiting police wagons. The crowd roars and presses forward, shouting, "The whole world is watching; the whole world is watching."

Demonstrators who agree in advance to be arrested form affinity groups, learn how to block entrances peacefully, how to succumb to or resist arrest in non-violent ways, and how to support each other and make group decisions at demonstration and holding sites. Supporters who do not wish to be arrested learn how to watch and record the demonstration's progress in order to gather evidence for any court appearances that may result. Volunteer attorneys advise would-be arrestees of their rights and responsibilities and represent them in court.

Inspired by the Gandhian philosophy of nonviolence and the concept of civil disobedience, the direct action movement has developed an array of methods that draw public attention to political issues, but do so in ways designed to minimize bodily harm. Nonviolence preparation preceding a planned action may involve several hours of training. Such sessions typically cover:

- The history and philosophy of direct action and nonviolence, including role plays on the use of nonviolence and nonviolent responses to violence.
- Role plays and exercises in decision making, conflict resolution, and quick decision making.
- A presentation on the legal ramifications of civil disobedience, and discussion on noncooperation and bail solidarity.

- Exercises and discussion of the role of social oppression and the progressive movement.
- Discussions on what is an affinity group and what are the roles within the group.
- A sharing of fears and feelings related to nonviolence and nonviolent action.[40]

The direct action movement evolved out of the civil rights sit-ins and antiwar demonstrations of the 1960s and 1970s. Environmental groups began to use the techniques to protest nuclear-power plants in the 1970s. The Clamshell Alliance that demonstrated for many years against New Hampshire's Seabrook nuclear reactor, and the west coast Abalone Alliance that protested the construction and start-up of California's Diablo nuclear power plant further developed the method. Other actions such as the Women's Pentagon Action (1980), the Livermore Action Group (1982 and 1983), and the Rocky Flats, Colorado, actions of the mid-1980s used nonviolence to protest nuclear-weapons research and funding. The Pacific Stock Exchange Action in San Francisco was planned in coordination with a similar Wall Street Action by a coalition that included Greens, left Greens, the National Toxics Campaign, and the Environmental Project on Central America in order to make visible the central role played by "banks, stock traders, insurance operators and corporate headquarters" in an economy that "profits from destroying forests, building nuclear weapons, and poisoning our food and water." Earth First!s' Redwood Summer (1990) was similarly committed to nonviolence and held advance training sessions on how to respond to confrontations with the timber industry.[41]

Nonviolent direct action has had both successes and failures in achieving its goals. On the positive side, its methods bring public attention to the issues, since demonstrations often make newspaper and television headlines. The movement pushes the dialogue further to the Left, so that organizations such as the Sierra Club and the National Wildlife Federation appear more centrist. It raises people's consciousness about issues so that more moderate initiatives and legislation have a better chance of passing. Some protests have been very successful both in planning, implementation, and subsequent solidarity among the participants and arrestees. On the negative side, because the large crowds that may be attracted to a planned nonviolent action are difficult

to control, demonstrations may deteriorate into unfocused, unruly, and even violent occasions where people may be harmed and property damaged. Such instances have marked the World Trade Organization (WTO) protests in Seattle, Washington (1999), World Economic Forum in Davos, Switzerland (2001), the WTO meetings in Cancun, Mexico (2003), and numerous meetings of the World Bank, International Monetary Fund (IMF), and North American Free Trade Organization (NAFTA) (see chapter 9).

CONCLUSION

The early twenty-first century finds an environmental movement that is vigorous, yet diverse and deeply factionalized. Many different groups have sprung up and organized around a multiplicity of causes. Major divisions exist between mainstream politics and movement activism, white majorities and ethnic minorities, conservatives and radicals, wilderness preservationists and humanists. Most mainstream environmental groups, such as the Group of Ten, work within established structures of governance that reproduce the social order, pushing them to repair the problems of production by passing new laws to clean up the environment and preserve open spaces. Green parties and movements envision new forms of responsive governance, especially at the community level, that will reproduce society in ecologically responsible ways.

For much of the anti-toxic and environmental justice movements, human health and welfare problems are rooted in the malign side-effects of industrial-capitalist development. These groups try to resolve the contradictions between production and reproduction that prevent people, especially minorities and the poor, from reproducing their daily lives in healthy neighborhoods with a reasonable standard of living. Their homocentric approach seeks a resolution of environmental problems that will benefit the underclasses (women, minorities, wage laborers, and Third World peoples), either through tighter regulation of the externalities of production or a major restructuring of the economy itself.

For Earth First!ers, many Greenpeace activists, and deep ecologists, the welfare of wilderness and other species has priority over, or equal to, the welfare of humans. These groups directly confront the contradictions between production and reproduction that prevent animals, plants, and other living

things from reproducing themselves within their own local ecosystems. These biocentric and ecocentric approaches see humans as only one part of nature, ideally a much smaller part, than that occupied by present populations. Yet the seemingly separate issues of wilderness and people's health are beginning to merge, as toxic dumps and radioactive wastes poison the wilderness and inner cities are made healthier through restoring "the wild" within their boundaries. Whether the various groups can build coalitions or partnerships that offer mutual support for each other's issues, thinking globally, yet acting locally, is a question yet to be answered.

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8

ECOFEMINISM

In Kenya, women of the Green Belt movement band together to plant millions of trees in arid, degraded lands. In India, they join the *chipko* (tree-hugging) movement to preserve precious fuel resources for their communities. In Sweden, feminists prepare jam from berries sprayed with herbicides and offer a taste to members of parliament: they refuse. In Canada, women take to the streets to obtain signatures opposing uranium processing near their towns. In the United States, housewives organize local support to clean up hazardous waste sites. All these actions are examples of a worldwide movement, increasingly known as "ecofeminism," dedicated to the continuation of life on earth.

Ecofeminist actions address the contradiction between production and reproduction. Women attempt to reverse the assaults of production on both biological and social reproduction by making problems visible and proposing solutions (see Figure I.1). Although women may or may not identify themselves explicitly as ecofeminists, they nevertheless assume or act on the connections between women and nature. When radioactivity from nuclear power-plant accidents, toxic chemicals, and hazardous wastes threaten the biological reproduction of the human species, women experience this contradiction as assaults on their own bodies and on those of their children and act to halt them. Household products, industrial pollutants, plastics, and packaging wastes invade the homes of First World women threatening the reproduction of daily life, while direct access to food, fuel, and clean water for many Third

World women is imperiled by cash cropping on traditional homelands and by pesticides used in agribusiness. First World women combat these assaults by altering consumption habits, recycling wastes, and protesting production and disposal methods, while Third World women act to protect traditional ways of life and reverse ecological damage from multinational corporations and the extractive industries. Women challenge the ways in which mainstream society reproduces itself through socialization and politics by envisioning and enacting alternative gender roles, employment options, and political practices.

THE EMERGENCE OF ECOFEMINISM

Ecofeminism emerged in the 1970s with the increasing consciousness of the connections between women and nature. French writer Françoise d'Eaubonne founded the Ecology-Feminism (Ecologie-Féminisme) Center in Paris in 1972 and, in 1974, used the term, "ecofeminisme," in her book, *Feminism or Death*, in which she called upon women to lead an ecological revolution to save the planet. Such an ecological revolution would entail new gender relations between women and men and between humans and nature. D'Eaubonne saw pollution, destruction of the environment, and run-away population growth as problems created by a male culture. The planet itself was in danger of dying, taking humanity along with it. A society recast in the "feminine," however, would not mean power in the hands of women, but no power at all.[1] Threats to planetary life were also the grounds for a 1974 conference in Berkeley, California, organized by geographers Sandra Marburg and Lisa Watkins, entitled "Woman and Environment" ("a gathering of concerned persons meeting and discussing solutions to the most crucial threats to life"). Connections between women and nature and women and ecology were made in works by Sherry Ortner (1974), Rosemary Radford Ruether (1974), Susan Griffin (1978), and Carolyn Merchant (1980).[2]

In the United States, "eco-feminism" was developed in courses by Ynestra King at the Institute for Social Ecology in Vermont around 1976. It became a movement in 1980 as a result of a major conference that King and others organized on "Women and Life on Earth: Ecofeminism in the '80s" and of the ensuing 1980 Women's Pentagon Action in which two thousand women encircled the Pentagon to protest anti-life nuclear war and weapons development. In 1983 Leonie Caldecott and Stephanie Leland edited *Reclaim the*

Earth: Women Speak Out for Life on Earth. A West Coast ecofeminist conference was held at Sonoma State University in 1981 and a WomanEarth Feminist Peace Institute took place in 1986. In 1987, in celebration of the twenty-fifth anniversary of Rachel Carson's *Silent Spring*, Irene Diamond and Gloria Orenstein organized a conference on "Ecofeminist Perspectives: Culture, Nature, Theory" at the University of Southern California and in 1989 Judith Plant published a book of articles entitled, *Healing the Wounds: The Promise of Ecofeminism*. Women in the United States and other countries (such as England, Australia, Sweden, Germany, India, Africa, and Brazil) continued to inject new life into ecofeminism through anthologies, conferences, and political actions that further developed the connections between women, nature, ecology, development, and threats to life on earth.[3]

In the 1990s, the organization WEDO (Women, Environment, and Development Organization) held the 1991 World Women's Congress for a Healthy Planet in Miami in preparation for the 1992 Rio de Janeiro Earth Summit and since then has continued to engage women internationally for other United Nations conferences. In 1995, a conference on "Ecofeminist Perspectives" was held at Ohio State University and later that year Irene Diamond and Carolyn Merchant organized an "Ecofeminist Encampment" at Mountain Grove, Oregon. Numerous books and newsletters continue to appear and conferences and environmental actions have taken place around the world as women embrace ecofeminism or engage in actions dealing directly with women's connections to nature and the environment.[4]

ECOFEMINIST ETHICS

Many ecofeminists advocate some form of an environmental ethic that deals with the twin oppressions of the domination of women and nature through an ethic of care and nurture that arises out of women's culturally constructed experiences. As philosopher Karen Warren conceptualizes it:

> An ecofeminist ethic is both a critique of male domination of both women and nature and an attempt to frame an ethic free of male-gender bias about women and nature. It not only recognizes the multiple voices of women, located differently by race, class, age, [and] ethnic considerations, it centralizes those voices. Ecofeminism builds on the multiple perspectives of those whose perspectives are typically omitted or undervalued in dominant discourses, for example

> Chipko women, in developing a global perspective on the role of male domination in the exploitation of women and nature. An ecofeminist perspective is thereby…structurally pluralistic, inclusivist, and contextualist, emphasizing through concrete example the crucial role context plays in understanding sexist and naturist practice.[5]

An ecofeminist ethic, Warren argues, would constrain traditional ethics based on rights, rules, and utilities, with considerations based on care, love, and trust. Her many books further elaborate the ecofeminist ethic and philosophy.[6]

Yet an ethic of care, as elaborated by some feminists, falls prey to an essentialist critique that women's nature is to nurture. Are not women themselves thereby complicit in the assumption that women are "by nature" more caring, more emotional, and more nurturing then men? If women, by identifying with nature, come to its rescue, do they not by these very actions cement their own oppression in a patriarchal society? Despite these concerns, women around the world have often consciously used perceived threats to their own bodies, communities, and nature itself as motivations for political action. They have used "mother earth" rhetoric to organize against the destruction of wilderness, mobilized to protest nuclear and toxic threats to women's bodies, formed coalitions with other women (and men) of different nationalities, races, and classes to mount direct actions, and brought their particular complaints and forms of oppression to the attention of policy-makers and international agencies.[7] Is there an ethic or means of organizing that can bring women together with other women and with men to engage in actions to save the planet?

My own approach to resolving these contradictions is through a partnership ethic that treats humans (including male partners and female partners) as equals in personal, household, and political relations and humans as equal partners with (rather than controlled by or dominant over) nonhuman nature (see chapter 3). Just as human partners, regardless of sex, race, or class must give each other space, time, and care, allowing each other to grow and develop individually within supportive non-dominating relationships, so humans must give nonhuman nature space, time, and care, allowing it to reproduce, evolve, and respond to human actions. In practice, this would mean not cutting forests and damming rivers that make people and wildlife in flood

plains more vulnerable to "natural disasters;" curtailing development in areas subject to volcanoes, earthquakes, hurricanes, and tornados to allow room for unpredictable, chaotic, natural surprises; and exercising ethical restraint in introducing new technologies such as pesticides, genetically-engineered organisms, and biological weapons into ecosystems. Constructing nature as a partner allows for the possibility of a personal or intimate (but not necessarily spiritual) relationship with nature and for feelings of compassion for nonhumans as well as for people who are sexually, racially, or culturally different from ourselves. It avoids gendering nature as a nurturing mother or a goddess and avoids the ecocentric dilemma that humans are only one of many equal parts of an ecological web and therefore morally equal to a bacterium or a mosquito.[8]

In what follows, I show how women around the world have made connections to nature, how they have used those connections as motivations to justify their actions, and how their actions, often in coalitions and partnerships, have helped to identify and create pathways toward resolving environmental problems. I use the categories of liberal, cultural, social, and socialist feminism to illustrate different approaches to the ways women have been concerned with improving the human/nature relationship and to show how each approach has contributed to an ecofeminist perspective (Table 8.1).[9]

Liberal ecofeminism is consistent with the objectives of reform environmentalism to alter human relations with nature from within existing structures of governance through the passage of new laws and regulations. Cultural ecofeminism (which during the 1980s developed out of and superceded radical feminism) analyzes environmental problems from within a critique of patriarchy and offers alternatives that could liberate both women and nature.

Social and socialist ecofeminists ground their analyses in capitalist patriarchy. They ask how patriarchal relations of reproduction reveal the domination of women by men, and how capitalist relations of production reveal the domination of nature by men. The domination of women and nature inherent in the market economy's use of both as resources would be totally restructured. Although cultural ecofeminism has delved more deeply into the woman-nature connection, social and socialist ecofeminism have the potential for a more thorough critique of domination and for a liberating social justice.

Table 8.1

Feminism and the Environment

	Nature	Human Nature	Feminist Critique of Environmentalism	Image of a Feminist Environmentalism
Liberal Feminism	Atoms Mind/Body dualism Domination of nature	Rational agents Individualism Maximization of self-interest	"Man and his environment" leaves out women	Women in natural resources and environmental sciences
Marxist Feminism	Transformation of nature by science and technology for human use	Creation of human nature through mode of production, praxis Historically specific, not fixed Species nature of humans	Critique of capitalist control of resources and accumulation of goods and profit	Socialist society will use resources for good of all men and women Resources will be controlled by workers Environmental pollution could be minimal since no surpluses would be produced Environmental research by men and women
Cultural Feminism	Nature is spiritual and personal Conventional science and technology problematic because of their emphasis on domination	Biology is basic Humans are sexual reproducing bodies Sexed by biology/gendered by society	Unaware of interconnectedness of male domination of nature and women Male environmentalism retains hierarchy Insufficient attention to environmental threats to women's reproduction (chemicals, nuclear war, radiation)	Woman/Nature both valorized and celebrated Reproductive freedom Against pornographic depictions of both women and nature

	Nature	Human Nature	Feminist Critique of Environmentalism	Image of a Feminist Environmentalism
Socialist Feminism	Nature is material basis of life: food, clothing, shelter, energy Nature is socially constructed Transformation of nature by production and reproduction	Human nature created through biology and praxis (sex, race, class, age) Historically specific and socially constructed	Leaves out nature as active and responsive Leaves out women's role in reproduction and reproduction as a category	Systems approach is mechanistic not dialectical Both nature and human production are active Centrality of biological and social reproduction Dialectic between production and reproduction Multileveled structural analysis Dialectical (not mechanical) systems

Source: Carolyn Merchant, Diagram in *Reweaving the World: The Emergence of Ecofeminism*, ed. Irene Diamond and Gloria Orenstein, San Francisco: Sierra Club Books, 1990, reprinted by permission.

LIBERAL ECOFEMINISM

Liberal feminism characterized the history of feminism from its beginnings in the seventeenth century until the 1960s. It is rooted in liberalism, the political theory that accepts the scientific analysis that nature is composed of atoms moved by external forces, a theory of human nature that views humans as individual rational agents who maximize their own self-interest, and capitalism as the optimal economic structure for human progress. It accepts the egocentric ethic that the optimal society results when each individual maximizes her own productive potential. Thus what is good for each individual is good for society as a whole. Historically, liberal feminists have argued that women do not differ from men as rational agents and that exclusion from educational and economic opportunities have prevented them from realizing their own potential for creativity in all spheres of human life.[10]

Twentieth-century liberal feminism was inspired by Simone de Beauvoir's *The Second Sex* (1949) and by Betty Friedan's *The Feminine Mystique* (1963). De Beauvoir argued that women and men were biologically different, but that women could transcend their biology, freeing themselves from their destiny as biological reproducers to assume masculine values. Friedan challenged the "I'm just a housewife" mystique resulting from post-World War II production forces that made way for soldiers to reassume jobs in the public sphere, pushing the "reserve army" of women laborers back into the private sphere of the home. The liberal phase of the women's movement that exploded in the 1960s demanded equity for women in the workplace and in education as the means of bringing about a fulfilling life. Simultaneously, Rachel Carson made the question of life on earth a public issue. Her *Silent Spring* (1962) focused attention on the death-producing effects of chemical insecticides accumulating in the soil and tissues of living organisms—deadly elixirs that bombarded human and nonhuman beings from the moment of conception until the moment of death.[11]

For liberal ecofeminists (as for liberalism generally), environmental problems result from the overly rapid development of natural resources and the failure to regulate pesticides and other environmental pollutants. The way the social order reproduces itself through governance and laws can be meliorated if social reproduction is made environmentally sound. Better science, conservation, and laws are therefore the proper approaches to resolving resource problems. Given equal educational opportunities to become scientists, natu-

ral resource managers, regulators, lawyers, and legislators, women, like men, can contribute to the improvement of the environment, the conservation of natural resources, and the higher quality of human life. Women, therefore, can transcend the social stigma of their biology and join men in the cultural project of environmental conservation.

Within the parameters of mainstream government and environmental organizations, such as the Group of Ten, are a multitude of significant opportunities for women to act to improve their own lives and resolve environmental problems. Additionally, women have established their own environmental groups. Organizations founded by women tend to have high percentages of women on their boards of directors. In California, for example, the Greenbelt Alliance was founded by a woman in 1958, the Save the Bay Association by three women in 1961, and the California Women in Timber in 1975 by a group of women. Yet, most of the women in these organizations do not consider themselves feminists and do not consider their cause feminist. Feminism as a radical label, they believe, could stigmatize their long-term goals. On the other hand, groups such as Friends of the River, Citizens for a Better Environment, and the local chapter of the Environmental Defense Fund employ many women who do consider themselves feminists and men who consider themselves sensitive to feminist concerns, such as equality, childcare, overturning of hierarchies within the organization, and creating networks with other environmental organizations.[12]

CULTURAL ECOFEMINISM

Cultural feminism developed in the late 1960s and 1970s with the second wave of feminism (the first being the women's suffrage movement of the early-twentieth century). Cultural ecofeminism is a response to the perception that women and nature have been mutually associated and devalued in western culture. Sherry Ortner's 1974 article, "Is Female to Male as Nature is to Culture?" posed the problem that motivates many ecofeminists. Ortner argued that, cross-culturally and historically women, as opposed to men, have been seen as closer to nature because of their physiology, social roles, and psychology. Physiologically, women bring forth life from their bodies, undergoing the pleasures, pain, and stigmas attached to menstruation, pregnancy, childbirth, and nursing, while men's physiology leaves them freer to travel,

hunt, conduct warfare, and engage in public affairs. Socially, childrearing and domestic caretaking have kept married women close to the hearth and out of the workplace. Psychologically, women have been have assigned greater emotional capacities with greater ties to the particular, personal, and present than men who are viewed as more rational and objective with a greater capacity for abstract thinking.[13]

To cultural ecofeminists the way out of this dilemma is to elevate and liberate women and nature through direct political action. Many cultural feminists celebrate an era in prehistory when nature was symbolized by pregnant female figures, trees, butterflies, and snakes and in which women were held in high esteem as bringers forth of life. An emerging patriarchal culture, however, dethroned the mother goddesses and replaced them with male gods to whom the female deities became subservient. The scientific revolution of the seventeenth century further degraded nature by replacing Renaissance organicism and a nurturing earth with the metaphor of a machine to be controlled and repaired from the outside. The ontology and epistemology of mechanism are viewed by cultural feminists as deeply masculinist and exploitative of a nature historically depicted in the female gender. The earth is dominated by male-developed and male-controlled technology, science, and industry.[14]

Often stemming from an anti-science, anti-technology standpoint, cultural ecofeminism 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. A vision in which nature is held in esteem as mother and goddess is a source of inspiration and empowerment for many ecofeminists. Spirituality is seen as a source of both personal and social change. Goddess worship and rituals centered around the lunar and female menstrual cycles, lectures, concerts, art exhibitions, street and theater productions, and direct political action (web-spinning in anti-nuclear protests) are all examples of the re-visioning of nature and women as powerful forces. Cultural ecofeminist philosophy embraces intuition, an ethic of caring, and web-like human-nature relationships.[15]

For cultural feminists, 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 perceived connection between women and biological reproduction turned upside down becomes the source of women's empowerment and

ecological activism. Women's biology and nature are celebrated as sources of female power. This form of ecofeminism has largely focused on the sphere of consciousness in relation to nature—spirituality, goddess worship, witchcraft—and the celebration of women's bodies, often accompanied by social actions such as anti-nuclear or anti-pornography protests.[16]

Much populist ecological activism by women, while perhaps not explicitly ecofeminist, implicitly draws on and is motivated by the connection between women's reproductive biology (nature) and male-designed technology (culture). Many women activists argue that 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. They protest against radioactivity from nuclear wastes, power plants, and bombs as a potential cause of birth defects, cancers, and the elimination of life on earth. They expose hazardous waste sites near schools and homes as permeating soil and drinking water and contributing to miscarriages, birth defects, and leukemia. They object to pesticides and herbicides being sprayed on crops and forests as potentially affecting children and childbearing women living near them. Women frequently spearhead local actions against spraying and power plant siting and organize citizens to demand toxic clean-ups.[17]

In 1978, Lois Gibbs of the Love Canal Homeowner's Association in Niagara Falls, New York, played a critical role in raising women's consciousness about the effects of hazardous waste disposal by Hooker Chemicals and Plastics Corporation in her neighborhood of 1,200 homes. Gibbs, whose son had experienced health problems after attending the local elementary school, launched a neighborhood campaign to close the school after other neighborhood women corroborated her observations. A study conducted by the women themselves found a higher than normal rate of miscarriages, stillbirths, and birth defects. Because the blue-collar male population of Love Canal found it difficult to accept the fact that they could not adequately provide for their families, the women became leaders in the movement for redress. Love Canal is a story of how lower-middle-class women who had never been environmental activists became politicized by the life and death issues directly affecting their children and their homes and succeeded in obtaining redress from the state of New York. "The women of Love Canal," said Gibbs at the 1980 conference on Women and Life on Earth, "are no longer at home tending

their homes and gardens. . . .Women who at one time looked down at people picketing, being arrested, and acting somewhat radical are now doing those very things."[18]

The majority of activists in the grassroots movement against toxics, are women (see chapter 7). Many became involved when they experienced miscarriages or their children suffered birth defects or contracted leukemia or other forms of cancer. Through networking with neighborhood women, they began to link their problems to nearby hazardous waste sites. From initial Not in My Backyard (NIMBY) concerns, the movement has changed to Not in Anybody's Backyard (NIABY), to Not On Planet Earth (NOPE). Thus Cathy Hinds, whose well water in East Gray, Maine was contaminated by chemicals from a nearby industrial clean-up corporation became "fighting mad" when she lost a child and her daughter began to suffer from dizzy spells. She eventually founded the Maine Citizens' Coalition on Toxics and became active in the National Toxics Campaign. Her motive was to protect her children. Women, she says, "are mothers of the earth," who want to take care of it.[19]

Native American women organized WARN, Women of All Red Nations, to protest high radiation levels from uranium mining tailings on their reservations, the high rates of aborted and deformed babies, as well as issues such as the loss of reservation lands and the erosion of the family. They recognized their responsibilities as stewards of the land and expressed respect for "our Mother Earth who is a source of our physical nourishment and our spiritual strength."[20]

Cultural ecofeminism, however, has its feminist critics. Susan Prentice argues that ecofeminism, while asserting the fragility and interdependence of all life, "assumes that women and men…have an *essential* human nature that transcends culture and socialization." It implies that what men do to the planet is bad; what women do is good. This special relationship of women to nature and politics makes it difficult to admit that men can also develop an ethic of caring for nature. Second, ecofeminism fails to provide an analysis of capitalism that explains why it dominates nature. "Capitalism is never seriously tackled by ecofeminists as a process with its own particular history, logic, and struggle. Because ecofeminism lacks this analysis, it cannot develop an effective strategy for change." Moreover, it does not deal with the problems of poverty and racism experienced by millions of women around the world.[21]

In *Ecofeminist Natures: Race, Gender, Feminist Theory, and Political Action* (1997), political theorist Noël Sturgeon engages in a constructive critique of the problem of essentialism in ecofeminism. By "ecofeminst natures" she means the use by some ecofeminists of biological, ahistorical, and homogenizing definitions of women as a group, nature as a single entity, and race as mode of defining particular groups of people. These essentialisms, however, may be seen as strategies for change that arise in particular contexts at particular historical moments in the evolution of ecofeminism in order to protest sexism, naturism, and racism. As practice, ecofeminist actions often use spiritual rituals that draw on female deities as a means of overcoming the sexism of the dominant worldview; direct actions that employ Mother Earth and Moral Mother imagery to overcome naturism and protest militarism; and coalitions of whites with women of color in an effort to overcome racism and achieve racial parity. Despite the engagement of ecofeminists with issues of race and class and the participation of Third World women, the majority of those in the movement are white.[22]

Sturgeon argues that categorizing and typologizing some feminist and ecofeminist approaches as essentialist undercuts their politically useful practices. She points out that almost all forms of ecofeminism (including social and socialist ecofeminism), as well as women who reject identification with ecofeminism, often employ woman/nature rhetoric to justify their actions. While Sturgeon's approach validates the use of such rhetoric to mobilize actions and the use of coalition politics for liberatory ends, it does not attempt to address the increasing globalization of capitalist patriarchy that underlies the structural domination of both women and nature.

In contrast to liberal and cultural ecofeminism, the social and socialist strands of ecofeminism are based on a critique of capitalism and patriarchy as underlying economic and political structures that need to be transformed in order to liberate women and nature.

SOCIAL ECOFEMINISM

Building on the social ecology of Murray Bookchin, social ecofeminism envisions the restructuring of society as humane decentralized communities. "Social ecofeminism," stated Janet Biehl in 1988, "accepts the basic tenet of social ecology, that the idea of dominating nature stems from the domination

of human by human. Only ending all systems of domination makes possible an ecological society, in which no states or capitalist economies attempt to subjugate nature, in which all aspects of human nature—including sexuality and the passions as well as rationality—are freed." Social ecofeminism distinguishes itself from goddess-worshipping cultural ecofeminists who acknowledge a special historical relationship between women and nature and wish to liberate both together. Instead it begins with the materialist, social feminist analysis of early radical feminism that sought to restructure the oppressions imposed on women by marriage, the nuclear family, romantic love, the capitalist state, and patriarchal religion. [23]

Social ecofeminism advocates the liberation of women through overturning economic and social hierarchies that turn all aspects of life into a market society that today even invades the womb. It envisions a society of decentralized communities that would transcend the public-private dichotomy necessary to capitalist production and the bureaucratic state. In such communities women emerge as free participants in public life and in local municipal workplaces.

Social ecofeminism acknowledges differences in male and female reproductive capacities, inasmuch as it is women and not men who menstruate, gestate, give birth, and lactate, but rejects the idea that these entail gender hierarchies and domination. Both women and men are capable of an ecological ethic based on caring. In an accountable face-to-face society, childrearing would be communal; rape and violence against women would disappear. Rejecting all forms of determinism, it advocates women's reproductive, intellectual, sensual, and moral freedom. Biology, society, and the individual interact in all human beings giving them the capacity to choose and construct the kinds of societies in which they wish to live.

But in her 1991 book, *Rethinking Ecofeminist Politics*, Biehl withdrew her support from ecofeminism, and likewise abandoned social ecofeminism, on the grounds that the concept had become so fraught with irrational, mythical, and self-contradictory meanings that it undercut women's hopes for a liberatory, ecologically-sane society. While early radical feminism had sought equality in all aspects of public and private life, based on a total restructuring of society, the cultural feminism that lies at the root of much of ecofeminism seemed to her to reject rationality by embracing goddess worship, to biologize and essentialize the caretaking and nurturing traits assigned by patriarchy to women, and to reject scientific and cultural advances just because they were

advocated by men. While Biehl's approach is a much-needed critique of the inconsistencies within ecofeminism, it fails to recognize the historicity and different political bases of the various strands within ecofeminism, feminism, green politics, and social ecology and to allow for a political and self-critical development of the emerging ecofeminist movement.[24]

Despite Biehl's critique, social ecofeminism continued to be taught at the Institute for Social Ecology by Chaia Heller and has been articulated by Heller and Ynestra King in a series of books and articles. In common with social ecology, they press for resistance to hierarchies that result in the domination of people and nature. In "Feminism and the Revolt of Nature" (1981), King argued that ecofeminism unites the repressed and bridges the theoretical gap by addressing all forms of oppression, including male and female, human and nonhuman nature. King distinguished between radical-cultural feminism and rational-materialist feminism, calling for a transformative feminism that moves beyond the culture-nature debate, is neither fully natural nor fully cultural, and is nonhierarchical.

Philosopher Karen Warren's ethic of care and Australian philosopher Val Plumwood's "ecosocial feminism" are likewise built on a fundamental critique of hierarchies in society and dualism in thought. Warren challenges value-hierarchical thinking, up-down dualisms, and power-over concepts that lead to a logic of domination. She advocates a pluralism based on inclusiveness and humaneness in relationships. According to Plumwood, all forms of dualism including male/female, culture/nature, master/slave, white/black, and heterosexual/homosexual stem from deep-seated Western modes of rationality that operate as interlocking systems of domination. Fighting the "web of oppression," Plumwood argues, requires cooperation and seeing the connections among a wide variety of issues.[25]

Social ecofeminists have participated in direct actions and political coalitions with other feminists and have organized conferences and classes to protest militarism, racism, and sexism. The 1980 "Women and Life on Earth" conference was followed by such events as the Women's Pentagon Action in 1980 and 1981, the WomanEarth Feminist Peace Institute in 1986, courses on social ecofeminism at the Institute for Social Ecology, Green gatherings, and the organization of Left Green coalitions.

While the organizing concepts of social ecology and social ecofeminism center on domination and hierarchy and challenge dualisms in Western culture, those of socialist ecology and socialist ecofeminism center on the

traditional Marxist ideas of production and reproduction and use dialectics rather than dualisms. Both forms of ecofeminism are united, however, in viewing capitalism and patriarchy as oppressive to women and nature and in viewing participation in ecofeminist actions as a means of liberation.

SOCIALIST ECOFEMINISM

Socialist ecofeminism is a feminist transformation of socialist ecology that makes the category of reproduction, rather than production, central to the concept of a just, sustainable world. Like Marxist feminism, it assumes that nonhuman nature is the material basis of all of life and that food, clothing, shelter, and energy are essential to the maintenance of human life. Nature and human nature are socially and historically constructed over time and transformed through human praxis. Nature is an active subject, not a passive object to be dominated, and humans must develop sustainable relations with it. It goes beyond cultural ecofeminism in offering a critique of capitalist patriarchy that focuses on the dialectical relationships between production and reproduction, and between production and ecology.[26]

A socialist ecofeminist perspective offers a standpoint from which to analyze social and ecological transformations, and to suggest social actions that will lead to the sustainability of life and a just society. It asks:

1. What is at stake for women and for nature when production in traditional societies is disrupted by colonial and capitalist development?
2. What is at stake for women and for nature when traditional methods and norms of biological reproduction are disrupted by interventionist technologies (such as chemical methods of birth control, sterilization, amniocentesis, rented wombs, and baby markets) and by chemical and nuclear pollutants in soils, waters, and air (pesticides, herbicides, toxic chemicals, and nuclear radiation)?
3. What would an ecofeminist social transformation look like?
4. What forms might socialist societies take that would be healthy for all women and men and for nature?

In his 1884 *Origin of the Family, Private Property, and the State*, Friedrich Engels wrote that "the determining factor in history is, in the last resort, the

production and reproduction of immediate life.…On the one hand, the production of the means of subsistence. . . on the other the production of human beings themselves." In producing and reproducing life, humans interact with nonhuman nature, sustaining or disrupting local and global ecologies. When we ignore the consequences of our interactions with nature, Engels warned, our conquests "take. . . revenge on us." "In nature nothing takes place in isolation." Elaborating on Engels' fundamental insights, I argue that women's roles in production, reproduction, and ecology can become the starting point for a socialist ecofeminist analysis.[27]

SOCIALIST ECOFEMINISM AND PRODUCTION

As producers and reproducers of life, women in tribal and traditional cultures over the centuries have had highly significant interactions with the environment. As gatherers of food, fuel, and medicinal herbs; fabricators of clothing; planters, weeders, and harvesters of horticultural crops; tenders of poultry; preparers and preservers of food; and bearers and caretakers of young children, women's intimate knowledge of nature has helped to sustain life in every global human habitat.

In colonial and capitalist societies, however, women's direct interactions with nature have been circumscribed. Their traditional roles as producers of food and clothing, as gardeners and poultry tenders, as healers and midwives, were largely appropriated by men. As agriculture became specialized and mechanized, men took over farm production, while migrant and slave women and men supplied the stoop labor needed for field work. Middle-class women's roles shifted from production to the reproduction of daily life in the home, focusing on increased domesticity and the bearing and socialization of young children. Under capitalism, as sociologist Abby Peterson points out, men bear the responsibility for and dominate the production of exchange commodities, while women bear the responsibility for reproducing the workforce and social relations. "Women's responsibility for reproduction includes both the biological reproduction of the species (intergenerational reproduction) and the intragenerational reproduction of the work force through unpaid labor in the home. Here too is included the reproduction of social relations—socialization." Under industrial capitalism, reproduction is subordinate to production.[28]

Because capitalism is premised on economic growth and competition in which nature and waste are both externalities in profit maximization, its logic precludes sustainability. The logic of socialism on the other hand is based on the fulfillment of people's needs, not people's greed. Because growth is not necessary to the economy, socialism has the potential for sustainable relations with nature. Although state socialism has been based on growth-oriented industrialization and has resulted in the pollution of external nature, new forms of socialist ecology could bring human production and reproduction into balance with nature's production and reproduction. Nature's economy and human economy could enter into a partnership.

Green socialist feminist Mary Mellor has criticized the world of capitalist "economic man" as one in which some men and some women are liberated at the expense of the rest of humanity and the planet. Modern economic systems are disembodied and disembedded from nature. Workplaces and homeplaces are segregated by gender and nature is marginalized as the realm of depleted resources and polluted places. Rather than living within socially created economic time, everyone must learn to live within the constraints of ecological sustainability and the biological time of fulfilling human needs for food, clothing, and shelter.[29]

In my view, the transition to a sustainable global environment and an equitable human economy that fulfills people's needs would be based on two dialectical relationships—that between production and ecology and that between production and reproduction. In existing theories of capitalist development, reproduction and ecology are both subordinate to production. The transition to socialist ecology would reverse the priorities of capitalism, subordinating production to sustainable forms of reproduction and ecology.

SOCIALIST ECOFEMINISM AND REPRODUCTION

Socialist ecofeminism focuses on the reproduction of life itself. In nature, life is transmitted through the biological reproduction of species in the local ecosystem. Lack of proper food, water, soil chemicals, atmospheric gases, adverse weather, disease, and competition by other species can disrupt the survival of offspring to reproductive age. For humans, reproduction is both biological and social. First, enough children must survive to reproductive age to reproduce the community over time; too many put pressure on the particular mode of

production, affecting the local ecology. Second, by interacting with external nature, adults must produce enough food, clothing, shelter, and fuel on a daily basis to maintain their own subsistence and sustain the quality of their ecological homes. Both the intergenerational biological reproduction of humans and other species and the intragenerational reproduction of daily life are essential to continuing life over time. Sustainability is the maintenance of an ecological-productive-reproductive balance between humans and nature—the perpetuation of the quality of all life.[30]

Biological reproduction affects local ecology, not directly, but as mediated by production. Many communities of tribal and traditional peoples developed rituals and practices that maintained their populations in a balance with local resources. Others allowed their populations to grow in response to the need for labor or migrated into new lands and colonized them. When the mode of production changes from an agrarian to an industrial base and then to a sustainable production base, the number of children that families' need declines. How development occurs in the future will help families decide how many children to have. A potential demographic transition to smaller population sizes is tied to ecologically sustainable development.

Ecofeminist political scientist Irene Diamond raises concern over the implications of "population control" for Third World women. "The 'advances' in family planning techniques from Depra-Provera to a range of implanted birth control devices, banned in western nations as unsafe, reduce Third World women to mindless objects and continue the imperialist model which exploits native cultures 'for their own good.'"[31] Second, with the availability of prenatal sex identification techniques, feminists fear the worldwide "death of the female sex" as families that place a premium on male labor opt to abort as many as nine out of every ten female fetuses. Third, feminists argue that women's bodies are being turned into production machines to test contraceptives, for *in vitro* fertilization experiments, to produce babies for organ transplants, and to produce black market babies for sale in the northern hemisphere.

Reproductive freedom means freedom of choice—freedom to have or not to have children in a society that both needs them and provides for their needs. The same social and economic conditions that provide security for women also promote the demographic transition to lower populations. The Gabriela Women's Coalition of the Philippines calls for equal access to

employment and equal pay for women, daycare for children, healthcare, and social security. It wants protection for women's reproductive capacities, access to safe contraception, and the elimination of banned drugs and contraceptives. It advocates equal, nondiscriminatory access to education, including instruction concerning consumer rights and hazardous chemicals. Such a program would help to bring about a sustainable society in which population is in balance with the fulfillment of daily needs and the use of local resources, a society that offers women and men of all races, ages, and abilities equal opportunities to have meaningful lives.

Australian political theorist Ariel Salleh has proposed a dialectical materialist form of ecofeminism in *Ecofeminism as Politics: Nature, Marx, and the Postmodern* (1997). Her ecofeminist politics presents a critique of capitalist patriarchy that deconstructs the dominant Eurocentric culture and reintegrates humanity and nature, while working toward a liberation of the poor and oppressed. She includes both women and men who struggle to create an earth democracy that reaches across cultures and species. Her politics unifies socialism, feminism, ecology, and postcolonial struggles for peace with the environment and among people.[32]

A socialist ecofeminist movement in the developed world can work in solidarity with women's movements to save the environment in the underdeveloped world. Using a partnership ethic, it can support ecological actions that also promote social justice. Like cultural ecofeminism, socialist ecofeminism protests chemical assaults on women's reproductive health, but puts them in the broader context of the relations between reproduction and production. It can thus support point of production actions such as the Chipko and Greenbelt movements in the Third World, protests by Native American women over cancer-causing radioactive uranium mining on reservations, and protests by environmental justice advocates over toxic dumps in urban neighborhoods.[33]

WOMEN AND DEVELOPMENT

Many of the problems facing Third World women today are the historical result of colonial relations between the First and Third Worlds. From the seventeenth century onward, European colonization of lands in Africa, India, the Americas, and the Pacific initiated a colonial ecological revolution

in which an ecological complex of European animals, plants, pathogens, and people disrupted native peoples' modes of subsistence, as Europeans extracted resources for trade on the international market and settled in the new lands. From the late eighteenth century onward, a capitalist ecological revolution in the Northern Hemisphere accelerated the extraction of cash crops and resources in the Southern Hemisphere, pushing Third World peoples onto marginal lands and filling the pockets of Third World élites. In the twentieth century, Northern industrial technologies and policies have been exported to the South in the form of development projects. Green Revolution agriculture (seeds, fertilizers, pesticides, dams, irrigation equipment, and tractors), plantation forestry (fast-growing, non-indigenous species, herbicides, chip harvesters, and mills), capitalist ranching (land conversion, imported grasses, fertilizers, and factory farms), and reproductive technologies (potentially harmful contraceptive drugs, sterilization, and bottle feeding) have further disrupted native ecologies and peoples.

Third World women have borne the brunt of environmental crises resulting from colonial marginalization and ecologically unsustainable development projects. As subsistence farmers, urban workers, or middle-class professionals, their ability to provide basic subsistence and healthy living conditions is threatened. Yet, Third World women have not remained powerless in face of these threats. They have organized movements, institutes, and businesses to transform maldevelopment into sustainable development. They are often at the forefront of change to protect their own lives, those of their children, and the life of the planet. While some might consider themselves feminists, and a few even embrace ecofeminism, most are mainly concerned with maintaining conditions for survival.

In India, nineteenth-century British colonialism in combination with twentieth century development programs have created environmental problems that affect women's subsistence, especially in forested areas. Subsistence production, oriented toward the reproduction of daily life, is undercut by expanding market production, oriented toward profit-maximization (see Figure I.1). To physicist and ecofeminist, Vandana Shiva, the subsistence and market economies are incommensurable:

> There are in India, today, two paradigms of forestry—one life-enhancing, the other life-destroying. The life-enhancing paradigm emerges from the forest and the feminine principle; the life-destroying one from the factory and the

> market.... Since the maximizing of profits is consequent upon the destruction of conditions of renewability, the two paradigms are cognitively and ecologically incommensurable. The first paradigm has emerged from Indian's ancient forest culture, in all its diversity, and has been renewed in contemporary times by the women of Garhwal through Chipko.[34]

India's Chipko, or tree-hugging, movement attempts to maintain sustainability. It has its historical roots in ancient Indian cultures that worshipped tree goddesses, sacred trees as images of the cosmos, and sacred forests and groves. The earliest woman-led tree-embracing movements are three-hundred years old. In the 1970s, women revived these chipko actions in order to save their forests for fuelwood and their valleys from erosion in the face of cash cropping for the market. The basis of the movement lay in a traditional ecological use of forests for food (as fruits, roots, tubers, seeds, leaves, petals and sepals), fuel, fodder, fertilizer, water, and medicine. Cash cropping, by contrast, severed forest products from water, agriculture, and animal husbandry. Out of a women's organizational base and with support by local males, protests to save the trees took place over a wide area from 1972 through 1978, including actions to embrace trees, marches, picketing, singing, and direct confrontations with lumberers and police.[35]

The Chipko movement's feminine forestry-paradigm is based on assumptions similar to those of the emerging science of agroforestry, now being taught in Western universities. Agroforestry is one of several new sciences based on maintaining ecologically viable relations between humans and nature. As opposed to modern agriculture and forestry, which separate tree crops from food crops, agroforestry views trees as an integral part of agricultural ecology. Complementary relationships exist between the protective and productive aspects of trees and the use of space, soil, water, and light in conjunction with crops and animals. Agroforestry is especially significant for small farm families, such as many in the Third World, and makes efficient use of both human labor and natural resources.[36]

In Africa, numerous environmental problems have resulted from colonial disruption of traditional patterns of pastoral herding as governments imposed boundaries that cut off access to migratory routes and traditional resources. The ensuing agricultural development created large areas of desertified land, which had negative impacts on women's economy. The farmers, mostly

women, suffered from poor yields on eroded soils. They had to trek long distances to obtain wood for cooking and heating. Their cooking and drinking waters were polluted. Developers with professional training, who did not understand the meaning of "development without destruction," cut down trees that interfered with highways and electrical and telephone lines, even if they were the only trees on a subsistence farmer's land.

Kenyan women's access to fuelwood and water for subsistence was the primary motivation underlying the women's Greenbelt Movement. According to founder Wangari Maathai, who won the Nobel Peace Prize in 2004, the movement's objective is to promote "environmental rehabilitation and conservation and…sustainable development." It attempts to reverse humanly-produced desertification by planting trees for conservation of soil and water.[37]

The National Council of Women of Kenya began planting trees in 1977 on World Environment Day. Working with the Ministry of the Environment and Natural Resources, they continued to plant trees throughout the country and established community woodlands on public lands. They planted seedlings and sold them, generating income. The movement promoted traditional agroforestry techniques that had been abandoned in favor of "modern" farming methods that relied on green revolution fertilizers, pesticides, new seed varieties, and irrigation systems that were costly and non-sustainable. During the past ten years, the movement has planted over seven million trees, created hundreds of jobs, reintroduced indigenous tree species, educated people in the need for environmental care, and promoted the independence and a more positive image of women.[38]

"The whole world is heading toward an environmental crisis," says Zimbabwe's Sithembiso Nyoni. "Women have been systematically excluded from the benefits of planned development.…The adverse effects of Africa's current so-called economic crisis and external debt…fall disproportionately on women and make their problems ever more acute." Twenty years ago there was still good water, wood, grass, and game even on semi-arid communal lands. Women did not have to walk long distances to obtain subsistence resources. But the introduction of Green Revolution seeds and fertilizers required different soils and more water than found on the common lands. The poor, primarily women, have borne the brunt of development that has proceeded independently of environmental consequences.[39]

According to Zimbabwe's Kathini Maloba, active in both the Greenbelt Movement and the Pan-African Women's Trade Union, many farm women suffer loss from poor crops on marginal soils, lack of firewood, polluted water, poor sanitation, and housing shortages. Women have suffered miscarriages from the use of chemical fertilizers and pesticides. In 1983, 99 percent of all farms had no protection from pesticides. Only 1 percent of employers heeded pesticide warnings and used detection kits to test pesticide levels in foods and water.

Development programs that emphasize people's needs within local environmental constraints would include: water conservation through erosion control, protection of natural springs, and the use of earthen dams and water tanks; in agriculture, the reintroduction of traditional seeds and planting of indigenous trees; in herding, the use of local grasses, seeds, and leaves for feed and driving cattle into one place for fattening before market; in homes, the use of household grey water to irrigate trees and more efficient ovens that burn less fuelwood.[40]

Latin American women likewise point to numerous environmental impacts on their lives. Both Nicaragua and Chile are countries in which socialist governments have been opposed by the United States through the use of economic boycotts and the funding of opposition leaders who supported conservative capitalist interests. Maria Luisa Robleto of the Environmental Movement of Nicaragua asserts that women are fighting to reverse past environmental damage. In Nicaragua, before the Sandinista revolution of 1979, many women worked on private haciendas that used large amounts of pesticides, especially DDT. Since the revolution, the position of women changed as part of the effort to build a society based on sustainable development. In part because of male engagement in ongoing defense of the country and in part because of the efforts of the Nicaraguan women's movement, women moved into agricultural work that was formerly masculine. Women were trained in tractor driving, coffee plantation management, and animal husbandry.

According to Robleto, women agricultural workers in Nicaragua have twenty times the level of DDT in their breast milk as non-agricultural workers. They want equal pay and an end to toxic poisoning from insecticides. If breast feeding is promoted as an alternative to expensive formula feeding, there must be a program to control toxics in breast milk. In a country where 51 percent of the energy comes from firewood, 39 percent of which is used

for cooking, there must be a forestry and conservation program oriented to women's needs. A grassroots movement is the spark for ecological conservation.

Chile's Isabelle Letelier of the Third World Women's Project (widow of the Chilean ambassador to the United States who was assassinated by Pinochet agents following the overthrow of the socialist Allende government in 1973), speaks of the power of *campesina* women who created life and controlled medicine and religion. The global society, she says, is out of control. The round planet must be saved. Women must take charge, since men are not going to solve the problems. Women must construct a society for both women and men. The rights of the land, the rights of nature, and women's rights are all part of human rights. Santiago is now one of the most polluted cities in the world. There are children who receive no protein and who resort to eating plastic. There is a television in every home, but no eggs or meat. There are colored sugars, but no bread. In 1983, says Letelier, women broke the silence and began speaking out for the environment. Without the help of telephones, they filled a stadium with 11,000 women. They established networks as tools; they learned to question everything, to be suspicious of everything. They learned to see. "Women give life," says Letelier. "We have the capacity to give life and light. We can take our brooms and sweep the earth. Like witches, we can clean up the atmosphere with our brooms. We can seal up the hole in the ozone layer. The environment is life and women must struggle for life with our feet on the ground and our eyes toward the heavens. We must do the impossible."

Gizelda Castro, of Friends of the Earth, Brazil, echoes the ecofeminist cry that women should reverse the damage done to the earth. "Men," she says, "have separated themselves from the ecosystem." Five hundred years of global pillage in the name of development and civilization have brought us to a situation of international violence against the land and its people. The genetic heritage of the south is constantly going to the north. Women have had no voice, but ecofeminism is a new and radical language. Women must provide the moral energy and determination for both the First and Third Worlds. They are the future and hope in the struggle over life.

In Malaysia, which received independence in 1957 as the British Empire underwent decolonization, many environmental problems have resulted from a series of five-year development plans which ignored both the environment

and conservation, especially the impact of development on women. "The rapid expansion of the cash crop economy which is hailed as a 'development success story' has plunged thousands of women into a poisonous trap," argues Chee Yoke Ling, lecturer in law at the University of Malaysia and secretary general of the country's chapter of Friends of the Earth. As land control shifted to large multinational rice, rubber, and palm oil plantations, women's usufructory rights to cultivate the land were lost to a male-dominated cash-exporting economy. They became dependent and marginalized, moving into low-paying industrial and agricultural jobs. Women workers constitute 80 percent of those who spray chemical pesticides and herbicides such as paraquat on rubber and palm plantations. They pour the liquid, carry the open containers, and spray the chemicals without protective clothing, even when pregnant or nursing. The workers are usually unaware of the effects of the chemicals and often cannot read the warning labels on the packaging. Protests resulted in loss of jobs or transfer to even less desirable forms of labor. In 1985, Friends of the Earth Malaysia began to pressure the Ministry of Health to ban paraquat. They called on plantation owners and government agencies to stop using the chemical for the sake of human right to life as well as the life of waters and soils.[41]

Third World women are thus playing an essential role in conservation. They are making the impacts of colonialism and industrial capitalism on the environment and on their own lives visible. They are working to maintain their own life-support systems through forest and water conservation, to rebuild soil fertility, and to preserve ecological diversity. In so doing, they are assuming leadership roles in their own communities. Although they have not yet received adequate recognition from their governments and conservation organizations for their contributions, they are slowly achieving the goals of ecofeminism—the liberation of women and nature.

ECOFEMINISM AND GLOBALIZATION

The women's tent at the 1992 Earth Summit in Rio de Janeiro bustled with activity. Stands of colorful scarves and saris from India, intricately decorated bowls and wooden utensils from the Pacific islands, and woven bags from Africa lined the tent's entryway. Tables of literature on population, women's rights, forest restoration, agriculture, and water purification surrounded the

huge central amphitheater, its rows of chairs occupied by hundreds of brightly dressed women from all over the world. A microcosm of the world's women, their collective problems, achievements, and energy, the tent was christened Planeta Fêmea (the female planet) by the Brazilian Women's Coalition that organized the women's component of the Global Forum—the NGO (non-governmental organizations) conference running parallel to the Earth Summit. Tape-recorders, translation headsets, and microphones hummed with the sounds of human voices emanating from the speakers' table in front. The speakers words, processed into many languages and common understandings, were finally interpreted by those eagerly listening to the reading of the final women's documents arrived at after months of preparatory conferences and two hot, exciting weeks of negotiations in Rio.[42]

A large number of international conferences and actions have taken place over the two decades between the first Earth Summit in Stockholm, Sweden, in 1982 to the 2002 Earth Summit in Johannesburg, South Africa, in which women have addressed issues of women's rights, ecological sustainability, population policies, and economic development. The 1992 Rio de Janeiro Earth Summit can be seen as a watershed in which women's roles in environment and development moved from peripheral add-ins to center stage.[43]

In order to present the needs and policy recommendations of women at the Earth Summit, two back-to-back conferences were held in Miami, Florida, in November 1991. Both conferences and the ensuing Earth Summit illustrated the potential for a partnership ethic. The first, the Global Assembly of Women and the Environment—Partners in Life, presented environmental case studies of the ways in which women throughout the world were managing and conserving resources to achieve sustainability. The second, the World Women's Congress for a Healthy Planet, attended by 1500 women from eighty-three countries, presented case studies of the impacts of past development projects on women and the environment to an international tribunal of female judges. Through an outstanding exercise in cooperation, partnership, and consensus, the conference formulated the *Women's Action Agenda 21* (an agenda for the twenty-first century), to be brought to the Earth Summit.[44]

The Planeta Fêmea conference, organized in cooperation with the Women's Environment and Development Organization (WEDO) in New York City, co-chaired by former Congresswoman Bella Abzug, was attended by representatives from women and environment organizations from all

over the world, as well as a constant stream of well-known female heads of state and local governments. After examining and debating the themes of the Miami *Women's Action Agenda 21*, the women's tent adopted the "Global Women's Treaty for NGOs Seeking a Just and Healthy Planet," which was incorporated into the Global Forum's final NGO treaty.

At the official Earth Summit in Rio Centro, the second document to emerge from the preparatory process was also adopted. "The Global Action for Women Towards Sustainable and Equitable Development," was included as Chapter 24 of UNCED's final document, *Agenda 21* (the 500 page agenda for the twenty-first century ratified at the Earth Summit). Additionally, women's interests were part of the Rio Declaration, the Earth Summit's 27-point proclamation that replaced the intended Earth Charter that was to have enunciated far-reaching ethical principles on human-human and human-environment relations. Item 20 of the Rio Declaration stated that "women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development."[45]

Women have formed coalitions and partnerships to bring their environmental concerns and survival problems to worldwide attention through other United Nations conferences, including the Conference on Population in Cairo (1993), the Fourth World Women's Conference in Beijing (1995) and the Beijing+5 follow up meeting in 2000. At the 2002 Johannesburg World Summit on Sustainable Development, WEDO in collaboration with South African women's groups organized a Women's Action Tent and developed the themes of the Women's Action Agenda 2015. In the final United Nations document, the centrality of women in development was reaffirmed and elaborated. Item 20 stated: "We are committed to ensuring that women's empowerment, emancipation and gender equality are integrated in all the activities encompassed within *Agenda 21*, the Millennium development goals and the Plan of Implementation of the Summit."[46]

CONCLUSION

Although the ultimate goals of liberal, cultural, social, and socialist feminists may differ as to whether capitalism, women's culture, or socialism should be the ultimate objective of political action, shorter-term objectives overlap. Weaving together the many strands of the ecofeminist movement is the

concept of reproduction construed in its broadest sense to include the continued biological and social reproduction of human life and the continuance of life on earth. In this sense there is perhaps more unity than diversity in women's common goal of restoring the natural environment and quality of life for people and other living and non-living inhabtants of the planet.

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9

ANTI-GLOBALIZATION AND SUSTAINABILITY

Cancun, Mexico, September 13, 2003. One hundred women—young, old, indigenous, Mexican, African, American, and European—with bolt cutters begin dismantling security walls surrounding the World Trade Organization (WTO) talks. Koreans attach 4-inch thick ropes to the tops of the walls. Thousands of protesters join together to pull the walls down, coming face to face with thousands of riot control police. Suddenly, the Koreans on the front line turn their backs to the police. The protesters sit on the ground. Hundreds of flowers appear and a memorial service for Korean farmer Lee Kyung Hae begins. A short time later, the protesters receive word that the talks have collapsed. Third World Nations have joined together, refusing to follow the lead of the European Union and the United States.[1]

THE ANTI-GLOBALIZATION MOVEMENT

On September 10, 2003 the Fifth Ministerial of the WTO opened its negotiations to great fanfare in lavish surroundings. On that day Lee Kyung Hae, head of the Korean Federation of Advanced Farmers Association, climbed the fence at Kilometer Zero and took his life with a knife to his heart. He was wearing a sign: The WTO Kills Farmers. His sacrifice in the name of small farmers around the world galvanized WTO opponents. Here are his words:

> I am 56 years old, a farmer from South Korea who has strived to solve our problems with the great hope in the ways to organize farmers' unions.…Since (massive importing) we small farmers have never been paid over our production costs.…Once I went to a house where a farmer abandoned his life by drinking a toxic chemical because of his uncontrollable debts. I could do nothing but listen to the howling of his wife. . . .
>
> Widely paved roads lead to large apartments, buildings, and factories in Korea. Those lands paved now were mostly rice paddies built by generations over thousands of years. They provided the daily food and materials in the past. Now the ecological and hydrological functions of paddies are even more crucial.…
>
> My warning goes out to all citizens that human beings are in an endangered situation. The uncontrolled multinational corporations and a small number of big WTO members are leading an undesirable globalization that is inhumane, environmentally degrading, farmer-killing, and undemocratic. It should be stopped immediately. Otherwise the false logic of neoliberalism will wipe out the diversity of global agriculture and be disastrous to all human beings.[2]

For WTO critics, Lee's plight and sacrifice symbolized the costs of corporate globalization on the land, lives, and labor of millions of ordinary people around the world, destroying their hopes for a better life. Lee had studied agricultural science at the university in Seoul, had created a model farm on his family's land, used it as a teaching college for live-in students, and was a leader in South Korea's largest farmers' organization. But when the government opened the market to imports and provided cheap loans, Lee went into debt losing his herds and land. Radicalized by the experience, he engaged in demonstrations, staged hunger strikes, and joined WTO protests in Europe. His final message of desperation in Cancun aroused millions.[3]

Created in 1995 following the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), the WTO moved beyond promoting tariffs that benefit corporations to promoting free trade itself—the relatively free movement of capital, goods, and services across national boundaries. The WTO regulates corporate products, such as genetically modified seeds and software copyrights, rather than the processes by which they are produced, such as sweatshops and air polluting factories. It also protects the property rights of corporations, including intellectual property (such as patents on plants, drugs, and software), and establishes an international body for resolving trade disputes. It thus protects property at the cost of process, critics

argue. The labor, environmental, and consumer movements of the past several decades have all achieved gains by regulating the processes by which products are made. Fair wages, safe working-conditions, and environmental regulations have contributed to healthier foods and a cleaner environment. Placing dispute regulation in the hands of an unaccountable international body undercuts national environmental and labor regulations that are accountable to democratic processes. The market and democracy are thus at odds. This fundamental conflict between capitalism and democracy lies at the heart of the anti-globalization movement.[4]

Grassroots globalization targets corporate globalization. The anti-globalization movement that burst on the world stage with the "Battle of Seattle" has grown. Activist protests over international environmental issues and the global corporate power exhibited by the WTO, World Bank, and IMF have included:

- *Seattle, Washington, 1999.* Fifty thousand labor and environmental activists shut down WTO talks for one day. The talks later collapse.
- *Davos, Switzerland, 2000.* Thousands gather to protest World Economic Forum talks by corporate CEOs and world leaders.
- *Washington, DC, 2000.* Twenty thousand people engage in non-violent protests against the World Bank and IMF.
- *Melbourne, Australia, 2000.* Thousands stage a blockade of the World Economic Forum.
- *The Hague, Netherlands, 2000.* Five thousand demonstrators call for international action on Global Climate Change.
- *Europe, 2000–2001.* Protestors uproot genetically engineered crops in Europe, India, and Brazil.
- *Florence, Italy, 2002.* One half million people converge to protest the privatization of public services (education, health, water, energy, and transportation) at the first European Social Forum (ESF).
- *Cancun, Mexico, 2003.* Thousands protest WTO talks. Representatives of developing nations walk out of the meeting. The talks collapse.
- *Miami, Florida, 2003.* Thousands of people from all over the Americas pour into Miami to protest talks to establish a Free Trade Area of the Americas (FTAA), an expansion of the North American Free Trade Agreement (NAFTA). The talks fail to create the full agreement.[5]

Such actions exemplify a new, coordinated level of environmental activism. As environmental gains have been undercut by corporate globalization, grassroots environmental protests have also globalized. While some protest groups wish to make the WTO more transparent, democratic, and responsive to the concerns of labor and the environment, other groups wish to abolish the WTO altogether and to create a global solidarity movement to achieve social and environmental justice. Anti-globalization, however, is flip side of the coin of sustainable development and the creation of sustainable livelihoods. Like anti-globalization, achieving sustainability can take many pathways having different ultimate goals. Common to all, however, is a response to social injustice and the global ecological crisis through a variety of approaches.

SUSTAINABLE DEVELOPMENT

Mainstream sustainable development (to some people a contradiction in terms), as exemplified by the 1987 United Nations (Brundtland) report, *Our Common Future*, is homocentric and utilitarian in its approach.[6] The Sustainable Development (SD) movement is informed by both ecological science and deep ecological theory. Unlike green politics and ecofeminism, which act to resolve the contradiction between production and reproduction, the sustainability movement attempts to resolve the contradiction between production and ecology by making production ecologically sustainable. Like the green and ecofeminist movements, however, the SD movement is diverse, containing within it a spectrum of political approaches and ethical orientations (see Tables 9.1 and 3.1).

In 1983, the United Nations formed the World Commission on Environment and Development and charged it with preparing "a global agenda for change." Headed by Norwegian Prime Minister, Gro Harlem Brundtland, who had reached her position through years of political struggle as an environmental minister, it produced a major report, *Our Common Future,* in 1987. The commission, comprising world leaders from some twenty-two countries, sought wide input from organizations and individuals around the world. Its report discussed issues of population, food, species preservation, energy, industry, urbanization, and peace. It called for a new form of economic development that would sustain the resource base.

Table 9.1

Perspectives within the Environmental Sustainability Movement

Issues/Aspects	Ecological/Scientific Environmentalism	Social Ecology/Radical Environmentalism
a. View of nature and ecology	Strict preservation; ecocentrism Nature/wildlife protectionism	Natural resources as basis of production Ecology/nature is often linked to indigenous culture (or sometimes spiritual phenomena)
b. Theory and explanation of problems	Functionalist or technical analysis; science prevails; Causes often attributed to greed; poor education; overpopulation; inappropriate technology	Structural analysis Root causes are generally viewed as socio-political in nature Capital exploits nature
c. Ethics/ideology on human- nature	Biological determinism, "life-boat" ethics	Equality, social justice, non-exploitation
d. Political views	Liberal to conservative	Progressive/leftist to radical
e. View of people and population	Perceived superiority of educated scientists; Tendency to believe in Malthusian theory	Emphasis on inequitable distribution of wealth and exploitation of poor Anti-Malthusian views
f. Main topics of concern	Habitat, wilderness, biodiversity and animal species extinction, population, carrying capacity	Human rights and environment, environmental justice, toxic waste, worker health, food consumption/ inequities
g. Patterns of participation	Scientists, private sector, and state policy-makers decide on problem solving	Grassroots mobilization Empowerment of communities and disenfranchised
h. View of energy problems/issues	Insufficiency and poor technology and strict limits	Capitalist relations and corporate control create disparities and aggravate dependency on oil
i. Strategies to overcome "environmental" problems	Consciousness-raising; Nature Preservation/Protection Agency regulations; technocracy Appropriate technology Education, training Expand birth control Scientists provide fixes	Structural changes; break down corporate control that leads to natural and human degradation Social and community organizing, labor movements; political action; social equity Feminist and/or indigenous values; justice in resource distribution; human rights

Source: Lori Ann Thrupp, "The Political Economy of the Sustainable Development Crusade: From Elite Protectionism to Social Justice," presented at the 1990 Annual Meeting of the Association of American Geographers, Toronto, April, 1990, printed by permission of the author, revised/edited in 2004 by author.

"Humanity has the ability to make development sustainable," declared the Brundtland Report, "to ensure that it meets the needs of the present without compromising the ability of future generations to meet their needs.... Sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfill their aspirations for a better life." To do this, population and growth must harmonize with the potentials and constraints of the ecosystem. Sustainable development will be the result of difficult choices, policies, institutions, and political will.[7]

The commission argued that beneficial economic growth will depend on two conditions: (1) the sustainability of the ecosystems involved in exchange, and (2) equity and an end to dominance in the basis for exchange. Sustainable growth in developing countries has been prevented by the debt burdens of Third World countries, whose trade profits must service debt rather than development, and by international projects that have brought short term profits while causing environmental destruction. World Bank and International Development Association projects should support long-term social goals and environmentally sound projects. Development assistance should be directed toward small projects with grassroots cooperation such as: sustainable-regenerative—rather than chemically-dependent—agriculture, reforestation, fuelwood development, watershed protection, soil conservation, agroforestry, rehabilitation of irrigation projects, small-scale agriculture, and low-cost sanitation measures.

Along with its recommendations in such areas as population, food, and energy, the commission made a number of specific recommendations on how to achieve sustainable economic growth. International commodity trade agreements could be improved in several crucial respects:

1. Larger sums for compensatory financing to even out economic shocks would help to mitigate overproduction of commodities where production is close to the limits of environmental sustainability.
2. More assistance should be given to diversification from single-crop production and for promoting resource regeneration and conservation.
3. More of the environmental and resource costs associated with production should be reflected in the prices of goods produced in developing countries.

4. When transnational corporations introduce new technologies, plants, processes, or joint ventures into developing countries, they should adhere to codes that deal explicitly with the objectives of environmentally sustainable development.
5. Mission-oriented cooperative research ventures in developing countries should be focused on technologies that apply to dry land agriculture, tropical forestry, pollution control, and low-cost housing.[8]

While the Brundtland report has received much praise for its comprehensive examination of global environmental problems, its emphasis on a growth-oriented industrial model of development has been criticized by some developing countries. For example, a group of non-governmental organizations (NGOs) in Paraguay concluded that it emphasized the scientific knowledge of the West over indigenous forms of knowledge and did not appreciate the fact that research funded by the industrialized nations and multinational corporations would tend to favor their own interests rather than those of developing peoples. It proposed instead that development proposals should be judged according to three criteria: (1) improvement of people's lives in both quantitative and qualitative terms, (2) protection of the ecological and cultural heritage of a region, (3) helping the growth of citizens' organizations. Rather than aiming for a higher level of economic well-being for all, the world's rich should settle for smaller incomes so that the material conditions of the poor could improve.

A group of Latin American representatives who met in Mexico in October 1987 to evaluate the report agreed that the Brundtland Commission preferred the cultural and economic perspectives of the industrialized nations. They recommended that new models of industrial development be considered and that the United Nations Environmental Program give priority to regional programs.[9]

The Canadian Green Web newsletter went even further. In criticizing the growth-oriented perspective of the report, it argued that a true sustainable development would call for "a massive global transfer of wealth and the cancellation of Third-World debts.…Environmental protection also means an internal redistribution of productive wealth.…We live in a global ecological commons, and the solutions to the rapidly developing disaster we all face have to be global in nature." It criticized the report's human-centered perspective

that advocated conscious choices to save or eliminate particular species. The report's "resourcist" worldview implied that "other species do not have intrinsic value in their own right, but are considered 'resources' for human use."[10]

Lester Brown, founder of the Worldwatch Institute in Washington, D.C., envisions the sustainable society of 2030. If sustainability means "the capacity to satisfy current needs without jeopardizing the prospects of future generations," this entails: "protecting the ozone layer, stabilizing climate, conserving soils, stabilizing forests and population." By 2030, either sustainability will have been achieved or society will be in a process of continuing disintegration. Existing technologies and energy efficiency are Brown's keys to stabilizing environmental deterioration. Energy will be based on a solar-powered economy in which neither fossil fuels nor nuclear power play a major role—solar panels will be on every rooftop for water heating, and electricity will be supplied by solar power, hydropower, geothermal power, and wind energy. All products will be extraordinarily energy efficient; mass transit and bicycles will be the major transportation methods; agroforestry and small-scale farms will conserve soil; waste reduction and recycling will apply to *all* materials and will replace garbage disposal and land fills. New solar-based and recycling jobs will supersede fossil-fuel based jobs. Global population will have stabilized by 2030 at about eight billion. Values will be based less on material goods and more on fulfillment of human potentials. A transition to sustainability would require a major mobilization of policies, funding, and human energy, but the current global awareness makes that achievement possible.[11]

Both development-oriented and technological approaches to sustainability have been criticized. Economist Lori Ann Thrupp, sees the sustainability movement as split into two main camps (Table 9.1). The dominant group includes northern hemisphere scientists and protectionists who are primarily white, male, upper-middle class, educated professionals and who are employed by well-endowed mainstream environmental organizations, development agencies, banks, private consulting-firms, and universities. These groups are strongly oriented toward wilderness and species preservation, technological solutions, and population control. They tend to devalue social problems such as poverty, lack of housing, garbage and toxic waste disposal in poor areas and Third World countries, and worker health issues. The second group comprises First and Third World grassroots groups, indigenous peoples' movements, anti-establishment greens, urban minority groups, and

a few academics, all of whom stress social justice in land, health, education, and quality of life.

To both sides sustainable development (SD) has taken on the characteristics of a crusade, with SD replacing and encompassing 1970s nomenclatures such as appropriate technology, ecodevelopment, integrative rural development, and soft energy paths. Thrupp criticizes the mainstream SD movement as proposing well-intentioned, but over-simplified panaceas such as Third World park preserves, debt-for-nature swaps, population controls, and resettlement of peoples from fragile to less fragile ecozones, rather than addressing northern hemisphere causes such as exploitative investments, over-consumption, trickle-down fund and technology transfers, and lack of law enforcement. Instead she proposes progressive strategies that hear and empower poor majorities, grassroots groups, and indigenous peoples and support diversity in agroecosystems, economic products, and institutions. These should not be idealized or romanticized, but be directly supported through funds and material resources. At the top, centralized institutions can halt the fetishism of economic growth based on conventional economic indicators and GNP, introduce qualitative dimensions into development models, stop subsidizing resource-exploiting sectors, and enforce long-term conservation investments.[12]

Rather than sustainable development, which reinforces dominant approaches to development, women's environmental groups, and many other NGOs, have substituted the term "sustainable livelihood." Sustainable livelihood is a people's oriented approach that emphasizes the fulfillment of basic needs, health, employment, and old-age security, the elimination of poverty, and women's control over their own bodies, methods of contraception, and resources.[13] Such approaches are exemplified by localized sustainable agriculture, bioregionalism, and indigenous approaches to sustainability.

SUSTAINABLE AGRICULTURE

Don Jose Jesus Mendoza leans on his spade and surveys his plot of land. "People thought I was crazy, " he muses, "when they saw me mixing weeds with manure, water, and dirt. But when they saw I doubled my harvest last year, then they wanted to know how I did it." Mendoza is a sixty-year-old Nicaraguan farmer, carpenter, and poet who is part of an active *Campesino*

to *Campesino* (farmers teaching farmers) movement in Central America. An inventive, enthusiastic teacher, he tells his fellow farmers, "*Compañeros*, this course begins with two words and ends with two words: 'Organic Matter' and 'Organic Matter.'"[14]

Sustainable agriculture is oriented to converting ecologically destructive production into environmentally sound production. Most organic farmers, ecological restorationists, and bioregionalists see humans as one part of an ecological web and implicitly employ an ecocentric land ethic.

Sustainable agriculture, as practiced by Nicaragua's Don Jose Mendoza, is an ecologically based form of farm management. Soil is a living thing. Feeding the soil, rather than feeding the plant alone, builds long-lasting fertility. Using biological processes maintains and improves the soil, whereas pesticides and herbicides degrade it. Synthetic fertilizers may serve the fertilizer industry rather than the soil. Excessive use of chemical inputs contaminates ground water. Instead, intensive management by the farmer working in harmony with nature optimizes yields. Compost, crop rotations, diversification, polycultures, cover crops, and careful selection of varieties lead to better tasting, nutritious products. Crops are selected for local markets, rather than for resistance to shipping damage, and for local climate and soil conditions, rather than for standardized green revolution seeds and technologies.

Before using sustainable agriculture, Nicaraguan peasants had employed the age-old method of slash and burn. They cleared land with fire and planted crops for two or three years in the nutrient rich soil. But as more people needed more land there was not enough to let the land lie fallow for the ten to twenty years needed to recover its fertility. They farmed the same soil without fertilizing or protecting it and dreamed of owning large amounts of land. "Now I know how to work the land," says Mendoza, "I'm just fine with my seven *manzanas* (approximately 12 acres)."

Mendoza's course is part of a Central American program in which farmers teach each other new sustainable methods of agriculture. Local agencies send their best campesino promoters and agricultural technicians to Campesino Development Centers to share knowledge and practices with each other. They then help to teach the techniques to their comrades back home. Because the campesino to campesino program is low-cost, and labor-intensive, it works well in agrarian communities where farmers have access to small plots of land.[15]

Sustainable agriculture is posited in opposition to industrialized agriculture, which is based on optimizing purchased inputs to produce outputs at the least cost. The "evolution from labor intensive to energy and capital intensive farming," says Miguel Altieri of the University of California at Berkeley, "was not influenced by rational decisions based on ecological considerations, but mainly by the low cost of energy inputs." In contrast, the ecological approach is based on principles that conserve the renewable resource base and reduce the need for external technological inputs. Scientists argue that sustainability can be achieved through ecological methods that incorporate the wisdom of traditional peoples.

According to Gordon Douglass of Pomona College in southern California, the principles of sustainable agriculture include:

1. The optimization of farm output over a much longer time period than is usual in industrial farming activities.
2. The promotion and maintenance of diversified agroecosystems whose living components perform complementary functions.
3. The building up of soil fertility with organic matter and the protection of nutrients from leaching.
4. The promotion of continuous cover and the extensive use of legume-based rotations, cover crops, and green manures.
5. The limiting of imported fertilizer applications and pesticide uses.[16]

In achieving sustainability, a systems approach is needed. A particular cover crop may add nitrogen and keep down dust and insects, but encourage nematodes in the soil. By retaining water, it may lower the temperature of an orchard or field and add to frost risk. Thus each change in the transition from high chemical inputs to natural methods needs to be evaluated in the context of the whole agroecosystem, rather than through a reductionist single component approach.[17]

Sustainable agriculture can be further extended to integrate the human community with the agroecosystem. "This holistic approach to farming communities," Douglass points out, "draws attention to interactions not only within [and] among farming families and other human member[s] of rural communities, but also between non-human components such as crops with crops, crops with animals, soil conditions and fertility with insects, and disease

in crops and livestock." Sustainable agriculture is thus based on an ecocentric ethic of management in which the land is considered as a whole, its human components being only one element. Policy decisions must be based on considerations of what is best for the soil, vegetation, and animals (including humans) on the farm as well as outside sources of water, air, and energy. As a result, humans and the land can be sustained together.[18]

Permaculture, as envisioned by Australians David Holmgren and Bill Mollison, carries sustainability a step further. This method of agriculture imitates ecosystem evolution toward climax states through perennial plant and animal crop interactions. In contrast to monocultural agriculture, permaculture uses several stories of trees, shrubs, vines, and perennial ground crops to absorb more light and nutrients, increasing the total yield. Plants and animals coexist in separate niches that reduce competition and promote symbiosis among species. Complexity not only helps to ward off catastrophes, but increases the variety of foods produced. External energy and physical labor decrease as perennials mature, so that energy needs are provided from within the system. Permaculture is highly adaptable and is applicable to a spectrum of habitats from tropical rainforests in Malaysia to arid deserts in Africa.[19]

In Salina, Kansas, Wes Jackson devotes his Land Institute to research and experimentation on perennial grains. Horrified by the loss of soil in the most productive lands of the United States, he sees in perennials the hope of saving soil, energy, and time in the fields. The goal is to find and breed perennial grasses that can produce high yields each year, and be planted in polycultures that reduce insects, pathogens, and weeds, and renew soil fertility, especially nitrogen and carbon. Researchers have planted four thousand wild relatives of annual grains in order to isolate hardy high yielding varieties that can be developed through further cross breeding. While the research is still experimental, a few promising grasses and legumes have emerged that could lead to sustainable ecosystem-based agriculture.[20]

Sustainable agriculture is a growing worldwide movement. It is supported by international research and funding efforts, through university research and cooperative extension programs, and by local farmers. Yet sustainable agriculture must also be integrated with farmworker rights that promote social justice and protection from exposure to pesticides and herbicides.

BIOLOGICAL CONTROL

The biological control of insects is a related example of sustainable management. Using ecological guidelines, natural insect enemies are introduced into the ecosystem to control population levels of pests. Uncultivated land surrounding fields harbors birds and pest enemies. Flowers along roadsides and fences are especially attractive to beneficial insects. Diversity in crops and surroundings and arrangements of beneficial plants mimic natural conditions. This makes crops less visible to insect enemies and acts as a barrier to the spread of pests.

The technique was pioneered in California in 1888. The cottony-cushion scale, introduced from Australia, was destroying citrus groves in southern California. Albert Koebele traveled to Australia and brought back the vedalia, a lady beetle that fed on the scale. One thousand beetles soon cleared acres of orange groves, saving the industry. This ecological strategy was vindicated in the 1940s when DDT killed so many of the vedalia that a resurgence of the scale occurred.[21]

The assumptions that underlie biological control and its related strategy, integrated pest management (IPM), are ecologically grounded. They contrast with chemical control, which assumes that humans are above nature and can legitimately use pesticides to obliterate insects for human benefit. "Biological control, together with plant resistance," writes IPM founder Carl Huffaker of the University of California, "are the core around which pest control in crops and forests should be built." Ecology provides the model for insect control. According to biologist Ray Smith, "we must understand Nature's methods of regulating populations and maximize their application."[22]

Biological control and IPM assume that humans are only one part of an interrelated ecological complex and that insects and humans must coexist. Insect populations will not be totally obliterated, but their numbers can be controlled so that humans may harvest crops. Reservoirs of insect pests, however, will continue to exist. This ecological interdependence implies that all organic and inorganic parts of the ecosystem have intrinsic value. Biological control is based therefore on an ecocentric ethic. This contrasts with the homocentric ethic of chemical-control techniques to manage insects. Chemical control assumes that humans are the most important parts of a

complex social and natural world and can manipulate that world for the good of society.[23]

RESTORATION ECOLOGY

A parking lot in California teams with blue-jeaned, tee-shirted volunteers. Shovels, buckets, trash containers, and day packs are scattered on the ground as they listen to the instructions of an ecologist. They have come together for a weekend outing to help restore a parkland newly purchased by the state. They enrich the soil with redwood chips and remove debris and the remnants of an old lumber operation. Guided by ecological principles, they plant young trees, ferns, huckleberries, and ground cover. Their plantings reintroduce the native species that will promote the ecological conditions under which insect, mammal, and bird communities can regenerate themselves. A new whole is created, helping to recreate the major elements of the presettlement ecosystem.[24]

Restoration is the process of restoring human-disturbed ecosystems to earlier pristine forms. It 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 reestablished.

Using ecological guidelines, species are planted according to their original distributions in close proximity to each other. Over time a process occurs in which synergistic relationships are reestablished among soils, plants, insect pollinators, and animals to recreate the prairie ecosystem. Like a doctor healing a patient or a helmsperson steering a boat, restoration is a process of synthesis in which humans put nonhuman nature back together again. It contrasts with the mechanistic model in which nature is like a clock that can be taken apart through analysis and repaired through external intervention. Restoration presents the dilemma of what historical period marks the benchmark for the process, but it nonetheless offers the hope of living symbiotically within the whole.[25]

But restoration need not apply just to parks and natural areas. Forests, deserts, wetlands, and even cities can be rehabilitated to be ecologically compatible with human uses. Biological principles are used to select fruits and nuts that can be harvested from rainforests allowing economic sustainability. Wetlands can be reconstructed by engineers and replanted by biologists.

Indigenous trees and succulents can restore human-created deserts to human-sustainable biosystems. Even cities can become ecocities by uncovering underground creeks and rehabilitating shorelines, marshes, and springs. Urban gardening in backyards and on rooftops, greenbelt areas for wildlife, and forest/meadow and water/land border zones can be created.

BIOREGIONALISM

Bioregionalists are local caretakers. Dedicated to the concept of living-in-place, they espouse "watershed consciousness." They urge that everyone know the source of their local water—where it comes from and were it goes, the hills and valleys into which it flows, and the creeks that lead it to rivers. How many people, rural and urban alike, know the type of soil on which their home is built, the names of even a few native plants and birds, and the mating seasons of local wild animals? How many know the way of life of the tribal peoples that preceded them, how they used the land, and what they gave back to it? Yet passing the bioregional quiz (Table 9.2) with a respectable score, is only the beginning of bioregional consciousness.

"Bioregions," writes Peter Berg (to whom the term is credited), "are geographic areas having common characteristics of soil, watersheds, climate, and native plants and animals that exist within the whole planetary biosphere as unique and intrinsic contributive parts." But beyond the geographical terrain is a terrain of consciousness—ideas that have developed over time about how to live in a given place. Bioregionalism differs from a regional politics of place in its emphasis on natural systems. It includes all the interdependent forms and processes of life, along with humans and human consciousness. "Bioregionalism," observes Jim Dodge, "is simply biological realism; in natural systems we find the physical truth of our being, the real obvious stuff like the need for oxygen as well as the more subtle need for moonlight, and perhaps other truths beyond those."[26]

The roots of bioregionalism go back to the early ecological concept of the biome system of classification, developed by Frederic Clements and Victor Shelford in the 1930s. Biomes were natural habitats such as grasslands, deserts, rainforests, and coniferous forests shaped by climate. Particular soils, vegetation, and animal life developed in each climatic region in accordance with rainfall, temperature, and weather patterns. In the 1970s, Raymond Dasmann,

Table 9.2

Where You At? A Bioregional Quiz

What follows is a self-scoring test on basic environmental perception of place. Scoring is done on the honor system, so if you fudge, cheat, or elude, you also get an idea of where you're at. The quiz is culture-bound, favoring those people who live in the country over city dwellers, and scores can be adjusted accordingly. Most of the questions, however, are of such a basic nature that undue allowances are not necessary.

1. Trace the water you drink from precipitation to tap.
2. How many days till the moon is full? (Slack of two days allowed.)
3. What soil series are you standing on?
4. What was the total rainfall in your area last year (July–June)? (Slack: 1" for every 20".)
5. When was the last time a fire burned in your area?
6. What were the primary subsistence techniques of the culture that lived in your area before you?
7. Name five native edible plants in your region and their season(s) of availability?
8. From what direction do winter storms generally come in your region?
9. Where does your garbage go?
10. How long is the growing season where you live?
11. On what day of the year are the shadows the shortest where you live?
12. When do the deer rut in your region, and when are the young born?
13. Name five grasses in your area. Are any of them native?
14. Name five resident and five migratory birds in your area.
15. What is the land-use history of where you live?
16. What primary event/process influenced the land form where you live? (Bonus special: what's the evidence?
17. What species have become extinct in your area?
18. What are the major plant associations in your region?
19. From where you're reading this, point north.
20. What spring wildflower is consistently among the first to bloom where you live?

Scoring

0–3	You have your head in a hole.
4–7	It's hard to be in two places at once when you're not anywhere at all.
8–12	A fairly firm grasp of the obvious.
13–16	You're paying attention.
17–19	You know where you're at.
20	You not only know where you're at, you know where it's at.

Source: Leonard Charles, Jim Dodge, Lynn Milliman, and Victoria Stockley. *Co-Evolution Quarterly*, Winter 1991, (subsequently known as the *Whole Earth Review*).

one of the founders of the bioregional movement, helped to redraw the global map in terms of its biotic provinces for the purposes of conservation of plants and animals. He then went on to distinguish between ecosystem people, who for millennia lived within and were dependent on the local ecosystem for survival, and modern biosphere people, who exploit the entire globe for trade in products, breaking down watershed and ecosystem constraints.[27]

Bioregionalists advocate a new ecological politics of place. It starts with "bundles" of materials describing a bioregion and its history—maps, native species lists, ecological studies, histories, stories, poems, and celebrations of the inhabitants' ways of life. From its roots in the Planet Drum Foundation in San Francisco in the 1970s, bioregionalism has grown to some 70–100 local North American groups whose addresses are their own bioregions. Annual gatherings in different watersheds around the country bring people together to develop and share strategies for change.

Knowing the land, learning the lore, developing the potential, and liberating the self are the tasks of the would-be bioregionalist as seen by Kirkpatrick Sale. Using the human and natural resources of a place entails ecological constraints. The local community is the best body to keep development within the guidelines of human–nature reciprocity. Through this participatory process, one draws closer to other members of the human community. The values inherent in the industrial-scientific paradigm and the bioregional paradigm stand in marked contrast (Table 9.3). The industrial model is neither timely nor sane, but outdated and irrelevant. The bioregional project is neither romantic, utopian, nor nostalgic, but realistic. The problems of moving from the former to the latter are both ecological and political. The changes will be

Table 9.3

The Bioregional Paradigm and the Industrial Scientific Paradigm

	Bioregional paradigm	Industrial scientific paradigm
Scale	Region Community	State Nation/World
Economy	Conservation Stability Self-sufficiency Cooperation	Exploitation Change/Progress World Economy Competition
Polity	Decentralization Complementarity Diversity	Centralization Hierarchy Uniformity
Society	Symbiosis Evolution Division	Polarization Growth/Violence Monoculture

Source: Kirkpatrick Sale, *Dwellers in the Land: The Bioregional Vision*, Philadelphia, PA: New Society Publishers, 1991, 50, reprinted by permission.

gradual, rather than sudden and revolutionary. They will depend on education, organization, and activism. But if carefully planned, introduced, and implemented, they will be steady, continuous, and truly transformative.[28]

Living within the resources of the local bioregion is one platform in the new politics of place. Using local water and energy sources, bioregional communities attempt to grow their own food and distribute it locally. Dovetailing with the restoration movement, they reconstruct rivers and creeks to support fish runs and clean up and restock lakes. Green city projects attempt to establish reciprocal relations between downstream consumer-dependent cities and upstream rural-producing farmlands and forests. City meetings bring together garbage collectors, industrial scrap companies, and recycling centers with park planners, neighborhood associations, and poets.[29]

The truly bioregional city, Sale argues, must be truly ecological. "The city would have to be as fully rooted in the earth, as close to the natural processes, as the farm and the village." This means growing food in community gardens and farmbelts, producing energy from solar collectors and wind generators, recycling solid and organic wastes, planting trees for producing oxygen and absorbing noise and dust, using mass transit systems, bicycles, and feet, and constructing buildings and homes out of local materials. It means returning organic composts and wastes to farms for reuse and bringing farm products back to the city for sale.[30]

But bioregionalism has its skeptics. Focusing on the neighborhood may preclude seeing the global context; emphasizing the native may obliterate the significance of the introduced, including humans. Ignoring the aquaducts that bring in water and the sewers that carry it away, the air systems that link one city's wastes to another's illnesses, and the imported plants and animals from all parts of the globe oversimplifies the real-world life-equation. "The truth is," lampoons critic Walter Truett Anderson, "that any concept of a 'natural' ecosystem is only a snapshot of how things were at some arbitrarily-chosen point of time. And if you do begin to pay attention to the artificial and new and exotic aspects of your environment, then you have opened yourself up to the contemplation of a world that is much, much more complex than the bioregionalists would have us believe. This is the real world, the world we live in now and are going to have to understand and deal with wisely." Despite such criticism, bioregionalism offers a program of change toward a sustainable way of life. As such it shares many of the goals of indigenous peoples.[31]

INDIGENOUS PEOPLES AND SUSTAINABILITY

Native peoples around the world are drawing on the concept of sustainable management as they attempt to preserve their ways of life. The indigenous Maori of New Zealand are both defending their land from environmental assaults and moving toward a sustainable form of land use. Their movement draws meaning from their traditional origin story of the earth mother and the forest:

> In the beginning there was the Nothingness. Then the Sky Father was joined by the Earth Mother and they had many children who in the darkness between their parents, craved for light.…Tane-mahuta god of the forests [said], 'It is better to tear them apart so that we may live with our Mother the Earth and be a stranger to our Father the Sky'.… So with sorrow and with tears he tore them apart, and with tears and sorrow heard their lamentations that he, their son, was destroying their great love. But Tane-mahuta was growth, and none could stay him until he had thrust the sky his Father far above; and there he stayed. And to this day, when you see the mists rise from the valleys, you will know that the Earth Mother still sighs for her lost love, while in the still morning his tears fall as the gentle dew.[32]

Today the Maori traditions are represented by the Maori Secretariat, in the Ministry for the Environment. The name of their movement, *Maruwhenua*, comes from the traditional Maori land ethic of human responsibility for shielding the land. The name reflects the saying, "People perish, but the land endures."

The Maori approach to sustainability begins with the following observations:

> Maori people have been denied the authority to influence decisions affecting them regarding resource use. Environmental degradation has seen Maori men and women often the worst affected.…The western industrialized approach has brought some good things to the world, but now a number of people are saying that the benefits have not been evaluated in terms of what's been lost. . . our heritage, language, and relationship between us and the land.…To address these global issues by starting at home, we need a strong contribution from Maori…one that reflects the cultural and spiritual values of the [land].[33]

In the rainforests of Sarawak, Malaysia, Penan gatherer-hunters are engaged in a desperate struggle to retain their way of life. Over five million

hectares of rainforest have been licensed for logging for export. Rainforest products are used for paper bags, toilet paper, shipping crates, and furniture by Northern Hemisphere consumers, who are unaware that each throwaway carton and each roll of toilet paper represents a violation of human and environmental rights in the Southern Hemisphere. Intensive logging in the Penan lands began during the 1980s, when logging activities shifted from peninsular Malaysia to the states of Sarawak and Sabah, formerly part of the British colony of Borneo, which joined the Malaysian federation in 1963. Timber concessions were given to politicians and ex-civil servants who became wealthy beneficiaries of the political economy of timber.

Occupying the upper tributaries of the Big Baram River (which flows into the South China Sea near the Sarawak town of Miri), the 9,000 Penan, traditionally nomadic gatherer-hunters are now mainly semi-settled shifting cultivators. Penan society is gentle and egalitarian. Women and men are equal participants in production, using the forest for sago palm, fruits, bearded pig, deer, monkey, fish, and rattan, all maintained for sustainable use. But logging has disrupted patterns of stewardship, destroying sago, fruit, and rattan patches, food sources for pig and monkey, and fishing rivers. Eroded hillsides, muddied rivers, compacted soil, and barren clearings form huge scars on the land.

After several years of failure to retain their lands through negotiation, the Penan gathered together in 1987 to stop the bulldozers and loggers from further advance. Men, breast-feeding mothers, and children walked across the mountains for days to join in creating roadblocks across logging routes. The blockades, which continued at regular intervals through the 1990s and 2000s and were supported internationally by rainforest action groups, disrupted logging for years. Most Penan, unable to support their families with traditional means of subsistence and despairing of government assistance are now cultivating tapioca and eating pond fish to supplement their diets. As the market economy encroaches on their subsistence economy, the Penan people are being transformed from independent communities to wage laborers in the logging industry and objects of curiosity for the tourist industry in Sarawak's Mulu National Park.

The Penan are supported by rainforest action groups who are trying to pass legislation in First World countries such as Japan, Australia, and the United States to ban imports of rainforest timbers from nonsustainable,

primary, and unlogged tropical forests. Second, rainforest groups have urged consumers not to purchase furniture, construction materials, chopsticks, and other products made of rainforest timbers such as *meranti*, or Pacific maple. Third, they have asked for support for rainforest people so that they may establish sustainable, environmentally and economically sound industries and new farming methods based on permaculture and sustainable agriculture. Fourth, a United Nations Biosphere Reserve has been proposed for the area. Clearly, development in regions such as Sarawak will continue. Whether that development is environmentally sustainable and respectful of the rights and wishes of people such as the Penan is an issue that requires new forms of cooperation and negotiation among indigenous peoples, industries, governments, and environmentalists.[34]

Similarly, Amazonian forest peoples are trying to show that development can respect the way of life of traditional peoples without destroying nature. Until his murder in December 1988 by rainforest clearcutters, Chico Mendes had worked to organize Amazonian rubber tappers. Taught to read newspapers and listen to the radio in the depths of the forest, Mendes led a struggle for social justice. In 1976 he and other rubber tappers marched into the forest and joined hands to stop crews from clearing the rubber trees. Women and children joined in the stand-off. "On at least four occasions we were arrested and forced to lie on the ground with them beating on us." he said. "They threw our bodies, covered in blood, into a truck. We got to the police station and we were a hundred people. They didn't have enough room to keep us there so in the end they had to let us go free." By 1989 the tappers estimated that they had saved some three million acres of rubber trees through the stand-off movement.[35]

Realizing the long-term limitations of the stand-off movement, the tappers began to press for a new legal status for the lands as "extractive reserves." The lands would be given use rights and collective long term leases by the state. Having obtained legal status, people could then organize schools, health clinics, and rubber processing stations. The movement for sustainable management was joined by native Indians who had historically been enemies of the tappers.

The Indigenous People's Union, founded in 1980, began lobbying for Amazonian Indian rights. They demanded that they participate in any development decisions on their lands. They put forward ways to sustain their lands

and ways of life. They protested the construction of two dams that would destroy the livelihoods of the Indians along with those of fishers and forest products extractors.

Together, the Alliance of Forest Peoples and the National Rubber Tappers' Council called for a role in designating areas of rubber and Brazil nut trees for development without destruction. They argued that the tropical forests could be used as extractive reserves for commercial products without cutting them down or degrading them. The reserves would be under the direct control of the users. Beyond this they called for resettlement of their native lands, an end to rent payments, and the rehabilitation of degraded lands.

By 1992, Brazil had established nine Amazonian reserves covering over two million hectares and an additional twenty-one state reserves in Rondônia, with long-term extractive rights for rubber tappers and Indians. As areas in which logging is prohibited, they are being used for extracting nuts, roots, oils, fruits, and pigments. Most of the products are marketed to companies in North America and Europe which use the nuts and oils in rainforest products. The products include new consumer items such as assai-flavored sherbet, cupuacu yogurt, babacu oil, patchouli-root soap, copaiba shampoo, priprioca perfume, and Amazonian latex condoms. The areas are estimated to be twice as profitable per hectare as cattle ranching and the soils will not degrade from clear-cutting.[36]

In Hawaii, the ancient volcanic goddess, Madame Pele is being defended by native Hawaiians who hope to preserve the United States' last tropical rainforest. Pele is active nature, both giver and taker of land. Her violent eruptions expand the island; her lava flows take back the soil from settlers. Hawaiian priests and priestesses gave her fruit and flowers. Hawaiians still offer her the first fruits of the *'ohelo* berries that grow on high lava fields. In the Polynesian origin story, the earth mother and sky father were united. From them the gods were born—the male gods of the ocean, of humans, and of agriculture and healing, and the female goddesses of fertility, of women's works and of humans. People and all living things were related. Mana, the energy of the world, descended from the godly ancestry to human families. Pele, who seduced her older sister's husband, was driven out of her homeland and crossed the sea to Hawaii, guided by her older brother in the form of a great shark. She went down the Hawaiian chain until she finally made her home in Kilauea volcano on the big island of Hawaii.[37]

In 1990, the Puna Geothermal Venture began drilling holes on the Big Island's Kiluea volcano for a geothermal power plant, enabling the Hawaiian Electric Company to harness steam to produce electricity for Hawaii's future development. Native Hawaiians who formed the Pele Defense Fund argued that the drilling violated their goddess Pele's sacred sanctuary. "Drilling is…a sacrilege, no different than trashing a Christian cathedral," said Palikapu Dedman, president of the Pele Defense Fund. The roads, power plants, and transmission line swaths, they claim, will ultimately destroy the delicate ecology of one of the last large tropical rainforests in the United States. Moreover, residents of the nearby Puna district argue that the hydrogen sulfide has made them ill with dizziness, vomiting, diarrhea, and sleeplessness. Geothermal advocates, on the other hand, point to the greater harm of oil burning power plants and the need to free the Hawaiian islands of dependence on foreign oil.[38]

As an alternative to using the land for geothermal development, the Rainforest Action Network proposes energy conservation. They argue that this is a cheaper method with far less impact on the land. If the state became an active participant in the efficiency revolution, it would be five times cheaper than the proposed geothermal plant and would save twice as much electricity. Improved lighting using compact fluorescent lamps, solar water heaters, more efficient refrigerators, and water-saving shower heads could save 68 percent of the energy used by private residences. Imported oil is refined primarily for use in jet airplanes (42 percent) and automobiles (20 percent), rather than for electricity (34 percent). Establishing strong building codes for future development will prevent further energy leaks in an already leaky energy tub. Energy efficiency combined with solar and wind energy would be adequate to meet the state's future energy needs.[39]

CONCLUSION

The anti-globalization and sustainability movements encompass mainstream and grassroots environmental organizations, scientists and political activists, and First and Third World concerns and peoples. Anti-globalization pushes for change and accountability of global economic organizations, while sustainability presses for on the ground ecological wisdom and social transformation. The anti-globalization movement seeks a more equitable economic system,

while the sustainability movement has the potential for transforming the conditions of production to make them more ecologically viable. Do these movements present viable options for meaningful transormation? The answer will depend in large part on the extent to which policies, labor, and funding are redirected toward progressive economic and politial prioities.

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CONCLUSION: THE RADICAL ECOLOGY MOVEMENT

What has the radical ecology movement accomplished? A broad range of answers to this question is possible. Radical ecology has not brought about a worldwide ecological or economic revolution. Nor is such a scenario likely in the immediate future. Its achievements are far more modest. As a theoretical critique of the mainstream environmental movement, it exposes social and scientific assumptions underlying environmentalists' analyses. As a movement, it raises public consciousness concerning the dangers to human health and to nonhuman nature of maintaining the *status quo*. In so doing, it pushes mainstream society toward greater equality and social justice. It offers an alternative vision of the world in which race, class, sex, and age barriers have been eliminated and basic human needs have been fulfilled.

What analyses and concrete results have radical theorists and activists contributed to the environmental movement?

CONTRIBUTIONS OF RADICAL THEORISTS

- Reality is a totality of internally related parts. The relationships are fundamental and continually shape the totality as contradictions and conflicts arise and are resolved.

- Social reality has structural (ecological and economic) and suprastructural (law, politics, science, and religion) features. Continual change is generated from of the contradictions and interactions among the parts and levels.
- Science is not a process of discovering ultimate truths of nature, but a social construction that changes over time. The assumptions accepted by its practitioners are value-laden and reflect their places both in history and society, as well as the research priorities and funding sources of those in power.
- Ecology is likewise a socially constructed science whose basic assumptions and conclusions change in accordance with social priorities and socially accepted metaphors.
- What counts as a natural resource is historically contingent and is dependent on a particular cultural and economic system in a given place and time.
- Surplus and scarcity are produced by economic interactions with nonhuman nature. Scarcity is both real—some resources are non-renewable over human lifespans—and created—economic producers control the technologies of extraction and the distribution of commodities.
- Human reproduction is not determined by indiscriminate sexual passions, but is governed by cultural norms and practices.
- Gender is created not only by biology, but by social practices.

CONTRIBUTIONS OF RADICAL ACTIVISTS

- The dangers of radioactive, toxic, and hazardous wastes to human health and reproduction have been exposed by citizen activists and regulations concerning disposal have been tightened.
- The siting of incinerators and landfills in poor and minority communities and Third World countries has been exposed as racist.
- The rapid clearcutting of tropical rainforests and Northern Hemisphere old growth forests by corporations on both public and private lands and the associated decimation of rare and endangered species have been brought to public awareness, and, in some areas, cutting has been curtailed.
- The slaughter of whales, dolphins, salmon, and other ocean species has been sharply criticized and, in some cases, curtailed or temporarily reduced.

- The dangers of pesticides and herbicides on foods and in water supplies and the availability of alternative systems of agriculture have been made visible.
- The viability of green parties as a source of political power has been recognized.
- The self-determination and power of indigenous peoples throughout the world to the right to control their own natural resources has become important.
- Direct, nonviolent action has become an acceptable and highly visible means of political protest.
- Alternative, nonpatriarchal forms of spirituality and alternative pathways within mainstream religions that view people as caretakers and/or equal parts of nature rather than dominators are being adopted by more and more people.
- The need for ecological education and individual commitment to alternative lifestyles that reduce conspicuous consumption and recycle resources is making headway.

While radical ecology has achieved specific gains and visibility, it nonetheless has its own limitations and internal contradictions. Radical ecology lacks coherence as a theory and as a movement. Theoreticians are deeply divided as to underlying ethical, economic, social, and scientific assumptions. Some deep ecologists wish to focus on redefining the meaning of self, others on redefining science and cosmology, still others on the connections between spirituality and deep ecology. Social ecologists and deep ecologists are at odds as to whether the priority lies with challenging and redefining the dominant worldview as the mode for initiating transformation or whether the preeminent strategy lies in the pursuit of social justice, with each camp accusing the other of lack of sophistication. Some social ecologists disdain spiritual ecology as politically naive and as a means of diverting energy away from social change, while many spiritual ecologists defend ritual as a way of focusing social actions. Ethically the camps are also in disagreement, with many deep ecologists and spiritual ecologists holding some form of ecocentric ethic, while social ecologists generally pursue a homocentric approach informed by ecological principles. Although the theoretical debates among proponents of radical ecology in general are often vituperative, they are equally incisive and healthy as a forum for clarification of assumptions and principles.

Similarly, green movements are divided along both theoretical and strategic lines. Green politics is fraught with disagreements between those who hold deep ecological and/or spiritual ecological assumptions and those who identify with social ecology and hold an ethic of social justice as the primary objective. Equally significant are the divisions between greens who wish to pursue a practical real-world strategy of working with other political parties to achieve ecological goals and greens who refuse to compromise fundamental movement principles and prefer to work outside the established political system. Ecofeminists are often critical of deep ecologists for their failure to recognize both biological and socially constructed differences, and are divided among themselves as to basic strategies for change, with some pressing for spiritual, others for social approaches, and still others seeking to combine ritual with action. Similarly the sustainability movement is divided among those who primarily follow scientific/ecological principles in advocating policy and those who incorporate or subordinate scientific strategies to social justice strategies.

Radical environmental movements also differ in different parts of the world. In the First World, much energy is directed toward mitigating the effects of toxic pollutants (e.g., chlorofluorocarbons, petroleum spills, PCBs, pesticides, and nuclear and hazardous wastes), preserving endangered species, saving wilderness, and promoting recycling. In the Third World a primary emphasis is on obtaining sufficient food, clean water, and adequate clothing for basic subsistence, developing appropriate technologies for cooking, heating, and farming, countering the effects of pesticide poisoning on human health, and preserving the lands of indigenous peoples.

Yet, just as the environmental and human health problems facing the developed and underdeveloped worlds are interdependent, so radical movements are linked. When toxic substances and pharmaceuticals are banned in the First World, they are often dumped in Third World countries. Radical movements expose and protest against such practices. When rainforests are cut in Third World countries, destroying indigenous habitats, First World environmental groups organize consumer boycotts of timbers and hamburgers. When Third World activists organize environmental protests, they receive support and assistance from First World activists. International environmental conferences produce international networks of groups helping other groups.

Within the First and Third World radical ecology movements, theory and practice are linked, each informing and inseparable from the other. Divisions among proponents open new avenues for both synthesis and criticism. The movement as a whole is both dynamic and timely. New ideas and new strategies for change are continually evolving; the door is always open to new people with energy and enthusiasm.

I have organized the preceding chapters around a framework that uses the concepts of ecology, production, reproduction, and consciousness in understanding both the ecological crisis and the ways of overcoming it. I have analyzed the crisis a result of two contradictions, the first between production and ecology, the second between production and reproduction (see Introduction and chapter 1). As these contradictions deepen, they push the world into greater ecological stress. The crisis could be relieved over the next several decades, however, through a global ecological revolution brought about by changes in production, reproduction, and consciousness that lead to ecological sustainability. Thus deep ecologists call for a transformation in consciousness from a mechanistic to an ecological worldview which transforms knowing, being, ethics, psychology, religion, and science, while spiritual ecologists focus on religion and ritual as ways of revering nature. Social ecologists call for a transformation in political economy based on new ecologically sustainable modes of production and new democratic modes of political reproduction. Partnership ethics can guide the changes.

Radical ecological movements attempt to resolve the contradictions that lead to the crisis through action. Green politics address the contradiction between production and reproduction, pressing for ways of reproducing human and nonhuman life that are compatible with ecosystem health and social justice. Ecofeminists press for gender equality and the subordination of production to the reproduction of life such that children will be born into societies that can provide adequate employment and security and have an ethic of nurturing both humans and nature. The anti-globalization movement protests the globalization of corporate capitalism and free trade that jeopardizes the world's ecological heritage and social equity. The sustainability movement focuses on the contradiction between ecology and production, devising ecologically-sustainable production technologies, restoring ecosystems, and promoting socially-just development programs.

Despite the accomplishments and the vision of radical ecologists, however, most of the world's power is presently concentrated in economic systems and political institutions that bring about environmental deterioration. The trends that split rich from poor, whites from people of color, men from women, and humans from nature remain. Radical ecology itself stands outside the dominant political, economic, and scientific world order. Together its various strands and actions challenge the hegemony of the dominant order. Because environmental problems promise to be among the most critical issues facing the twenty-first century, environmentalists will play increasingly important roles in their resolution. Radical ecology and its movements will continue to challenge mainstream environmentalism and will remain on the cutting edge of social transformation, contributing thought and action to the search for a livable world.

NOTES

INTRODUCTION
WHAT IS RADICAL ECOLOGY?

1. For this approach to self and society, I am indebted to my colleague Alan Miller's, *Gaia Connections: An Introduction to Ecology, Ecoethics, and Economics*, 2nd ed. (Lanham, MD: Roman and Littlefield, 2003), 224–234; to Jerry W. Sanders who formulated and used it in a world order course at City College of New York; and to my students in Conservation and Resource Studies, University of California, Berkeley, who are quoted anonymously.

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CHAPTER 3
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